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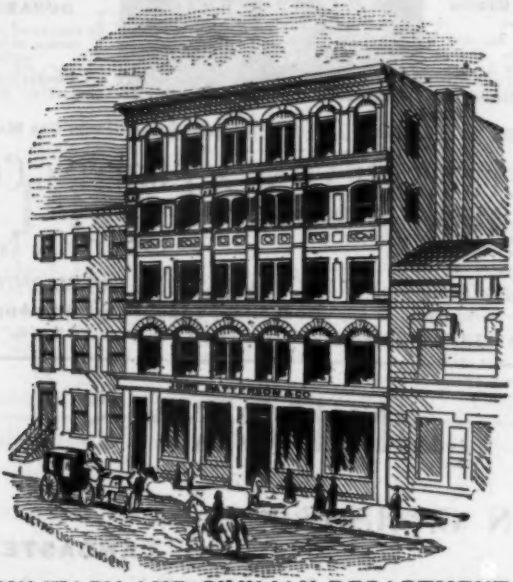

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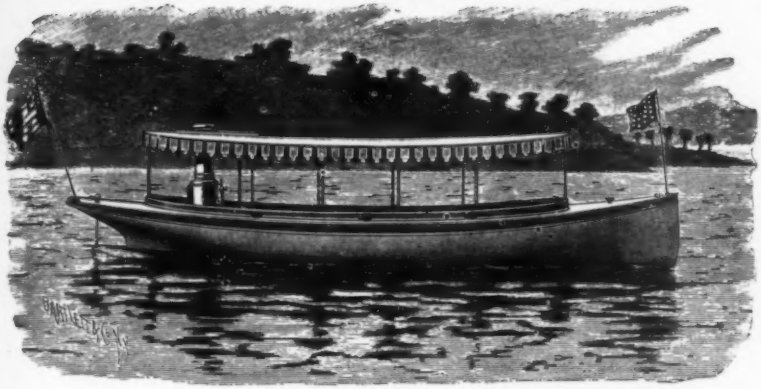

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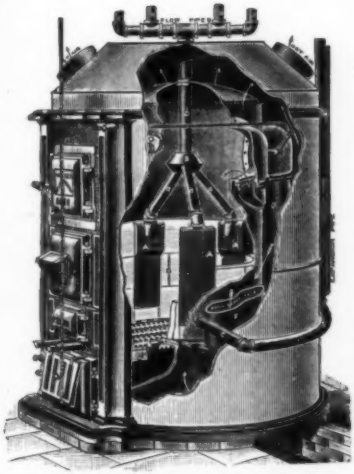

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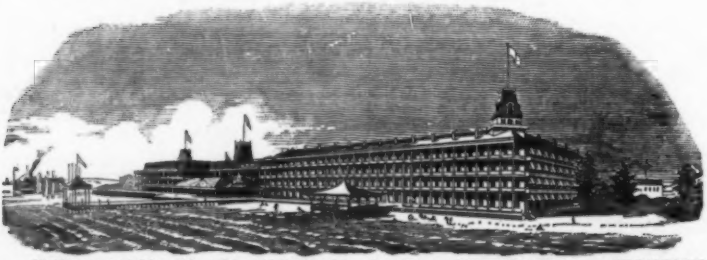

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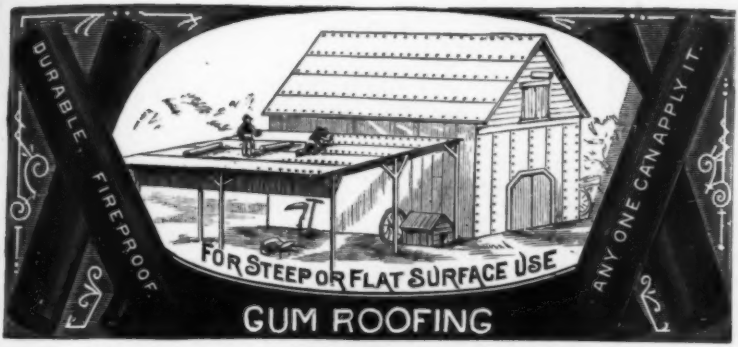

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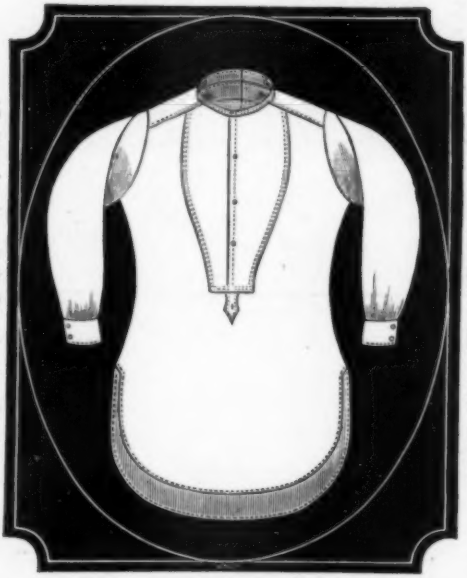

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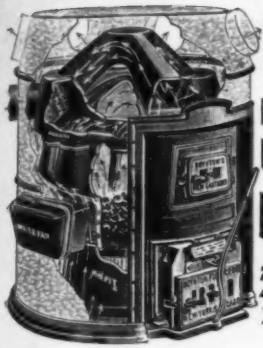

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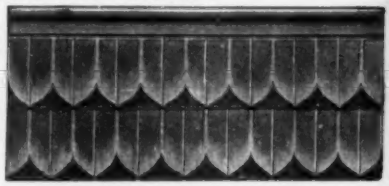

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CAVALRY IN VIRGINIA DURING THE WAR OF THE REBELLION.

BY BVT. COLONEL B. W. CROWNINSHIELD, U. S. V.*

LATE MAJOR 1ST MASSACHUSETTS CAVALRY.

WHEN the War broke out, the North was by far less prepared for the struggle than the South. The two sections afforded a very different material from which to organize an army.

In the South every man and boy was familiar with the use of weapons, and particularly skilled in the use of fire-arms. The entire population was used to horses, and all were good riders. In the North, particularly in the East, the population of farmers and mechanics devoted to peaceful pursuits was unaccustomed to all manner of arms, and as a rule strange to any horse but a work-horse; and not one in a hundred a good rider, while a very large proportion had never fired a gun. Nearly all horses kept for pleasure were trotters used in harness and never mounted.

The Regular Army remained with all its organization (except such officers as went with their States to the Confederate Army) to the North, and furnished the model for all three branches of

* A paper read before the Military Historical Society of Massachusetts and now published by permission of that Society.

The paper in the March number of the JOURNAL by General H. J. Hunt, upon "Our Experience in Artillery Administration" was also read before this Society instead of before the Massachusetts Historical Society, as erroneously stated in a footnote to that article.

the service. This model developed a steady infantry, a superlatively good artillery, never equalled in the South, and a cavalry better adapted to fight in line than the Confederate, which excelled in individuality, and consequently for scouting and irregular work. The Confederate cavalry was largely composed of Virginia regiments, who consequently fought on their own soil and were familiar with the remarkable system of by-roads, and who furnished scouts, spies and raiders on our line of communications, of singular excellence.

To the Federal Army were left the five old regular cavalry regiments, to which was added, in April, 1861, a sixth. It was at first proposed to confine the cavalry of the Federal Army to these six regular regiments, and for excellent reasons, as things looked then. That was the time when many of those who ought to have known, thought the War would be an affair of ninety days.

According to European ideas, a cavalry soldier is not supposed to be of any use in the field before a very careful training at a depot lasting from one to two years, and his horse requires the same time or longer.

In many armies the horses are specially reared for cavalry service in immense breeding establishments by the government; and in time of peace the cavalry is mounted exclusively on such animals. Each regiment has a depot-battalion where the men are drilled, and the horses prepared for service in the field. Such an establishment is thought indispensable. The regular cavalry of the United States has a cavalry depot at Jefferson Barracks, Missouri; but, owing to the great distance from the cavalry stations, few horses are trained there; and the men are put on full duty in much less time than is thought proper in Europe. The term of enlistment, five years here, and at least seven in Europe, largely determines this, and the recruit has to learn his duty with his regiment principally. Fortunately a large proportion of the enlisted men are veterans of many terms of enlistment.

At the commencement of the War it was impossible to instruct cavalry properly before putting it in the field, and consequently whole regiments of exquisite greenness were sent into Virginia mud in winter, there to try to learn, practically without a teacher, from books and hard knocks, in a few weeks or months at best, what in Europe in the best schools, under chosen instructors and with trained horses, years only can accomplish.

It cannot be wondered at, that the Government hesitated to enlist volunteer cavalry, and only yielded when the battle of Bull Run had shown the hollowness of the ninety-day idea. Another obstacle was the enormous expense of equipping and maintaining cavalry.

The equipments for a regiment of twelve hundred (1200) men alone cost nearly $300,000, the officer's pay was greater than that of the infantry, and a larger number of artificers was necessary. It cost in favorable times probably fifty cents a day for each horse, and in inaccessible places three or four times that amount for forage alone. It was obviously questionable whether, at any expense, an effective cavalry force could be evolved out of the peaceful Yankee citizen, unused to horses and arms, in any reasonable time. But mounted troops were necessary, and with its lavish bounty the Government did not shrink from the expense, nor hesitate at the difficulty of the task.

At first the volunteer regiments were made up of the militia cavalry companies both North and South; and all the companies in the first organized regiments bore high sounding names which, in the Federal service at least, were soon forgotten. In the Confederate cavalry the troopers generally owned their horses, and contracted for a certain pay (40 cents a day) to keep themselves mounted. I can only recall one regiment in the Army of the Potomac, the Third Indiana Cavalry, where the soldiers owned their horses. But in both armies the cavalry was a sort of *élite* corps, and men preferred to enlist in that branch, probably at the North because the would-be trooper preferred riding to walking, with perhaps an idea that at the end of a march his horse would be put up at some peripatetic livery stable. Certainly none had any definite idea of cavalry duties.

The men were enlisted from all the ranks of life with no reference to previous occupation and capability. No selection was even made according to size and weight. In Europe,—except for the showy, expensive and almost useless heavy cavalry, which graces processions, opera house entrances, imperial or royal drawing-rooms and staircases, and such pomps and vanities,—a cavalry soldier must be light and active, and is especially selected for that branch of the service.

A European authority says: "The men, therefore, intended for cavalry service, should be selected with the the utmost care respecting their disposition, size, and vigor of constitution, and should, above all, be chosen from

the service. This model developed a steady infantry, a superlatively good artillery, never equalled in the South, and a cavalry better adapted to fight in line than the Confederate, which excelled in individuality, and consequently for scouting and irregular work. The Confederate cavalry was largely composed of Virginia regiments, who consequently fought on their own soil and were familiar with the remarkable system of by-roads, and who furnished scouts, spies and raiders on our line of communications, of singular excellence.

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A European authority says: "The men, therefore, intended for cavalry service, should be selected with the the utmost care respecting their disposition, size, and vigor of constitution, and should, above all, be chosen from

those who have been accustomed to horses from their youth, such as the sons of hostlers, farmers, and others who love horses, and are capable of taking care of them and likewise of the harness and equipments with which they are entrusted. From other men than these it is difficult, almost impossible, to form a good cavalry. What, for instance, can be expected from a stocking manufacturer, or a linen weaver, who considers the horse a wild beast? We all know that such men rarely have confidence in their horses, but look upon them as their greatest enemies, against whom, for the future they must struggle for their lives. They never learn to ride, never can preserve their balance, but hang on the horse like a senseless lump, which in order to preserve its equilibrium, unnecessarily wastes a large portion of its strength, and on this account is soon exhausted. The injudicious selection of men for cavalry may be productive of infinite mischief."

But such principles were ignored in the great United States volunteer army, and the men ranged from pigmy to giant, and there was never any authority for changing them, after enlistment, into other branches of service according to fitness. Even later in the War, when experience should have taught better, whole regiments were recruited after the same ideas, and, as late as 1864, perfectly green company officers were put over them, and in some cases even inexperienced field officers.

In the South things were better managed. The cavalry service was especially well organized. All Southerners were good riders, particularly those of the better class. A good horse was a gentleman's pride, and the more important the gentleman, the better his horse. Consequently their cavalry combined the men of the best class mounted on the best horses,—at the commencement of the War largely thorough-bred or very well-bred animals.

The officers were well-known men of good social standing, and the field officers were many of them of the old regular U. S. Cavalry. I have understood that a considerable number of the old cavalry veterans of the Regular Army went South with their officers in 1861. Thus at the very beginning of the War, the Confederacy had a large force of capital cavalry; every man a bold rider, well mounted, expert with revolver and rifle.

We find in a Southern book,—McClellan's "Campaigns of Stuart's Cavalry,"—the following apropos of the Confederate horses and equipments.

"A consideration of the difficulties under which the cavalry of the Army of Northern Virginia labored will not be uninteresting to one who would form a true estimate of the services rendered by it.

"At the beginning of the War, the Confederate Government, charged as it was with the creation of an army and of war material of all kinds, felt

itself unable to provide horses for the numerous cavalry companies which offered their services, especially from the State of Virginia. Many companies organized as cavalry were rejected. With those that were enrolled the Government entered into a contract, the substance of which was that the cavalrymen should supply and own their horses, which would be mustered into service at a fair valuation; that the Government should provide feed, shoes, and a smith to do the shoeing, and should pay the men a per diem of forty cents for the use of their horses. Should the horse be killed in action, the Government agreed to pay to the owner the muster valuation. Should the horse be captured in battle, worn out, or disabled by any of the many other causes which were incident to the service, the loss fell upon the owner, who was compelled to furnish another horse, under the same conditions, or be transferred to some other arm of the service.

"That the Government should have adopted such a policy at the beginning of the War was a misfortune; that it should have adhered to it to the very end was a calamity against which no amount of zeal or patriotism could successfully contend.

"It is not in the spirit of unfriendly criticism that we to-day proclaim the unwisdom of such a policy. At the time all acquiesced in it, the cavalryman most cheerfully of all. Virginia was full of horses of noble blood. The descendants of such racers as Sir Archy, Boston, Eclipse, Timoleon, Diomede, Exchequer, Red Eye, and many others more or less famous on the turf, were scattered over the State. Gentlemen fond of following the hounds had raised these horses for their own use. They knew their fine qualities, their speed, endurance, and sure-footedness, and they greatly preferred to entrust their safety in battle to their favorite steeds rather than to any that the Government could furnish. But the Government might have furnished these horses at the outset, and by suitable activity it might have provided for replenishing the losses incurred in the service. The cavalrymen were kept mounted, but at an enormous loss of efficiency in the Army, and by a system of absenteeism which sometimes deprived the cavalry of more than half its numbers. Why should it have been thought that the people of Virginia would hold back their horses, when they refused nothing else to the Government?

"The evil results of this system were soon apparent, and rapidly increased as the War progressed. Perhaps the least of these was the personal loss it entailed upon the men. Many a gallant fellow whose horse had been irrecoverably lamed for the want of a shoe, or ridden to death at the command of his officer, or abandoned in the enemy's country that his owner might escape capture, impoverished himself and his family in order that he might keep his place in the ranks of his comrades and neighbors. Nor should it be a cause for wonder if this property question affected the courage of many a rider; for experience soon proved that the horse as well as the man was in danger during the rough cavalry *melée*. If the horse were killed the owner was compensated, but a wounded horse was a bad investment.

"By far the greatest evil of the system was the fact that whenever a cavalryman was dismounted, it was necessary to send him to his home to

procure a remount. To accomplish this required from thirty to sixty days. The inevitable result was that an enormous proportion of the command was continuously absent. Many of the men were unable to procure fresh horses within the time specified in their 'details,' and the column of 'Absent without leave' always presented an unsightly appearance. To punish such men seemed an injustice, and the relaxation of discipline on this point was abused by some with impunity. We have already seen that Fitz Lee's brigade, which should never have presented less than twenty-five hundred sabres in the field, was reduced to less than eight hundred at Kelly's Ford, on the 17th of March, and numbered less than fifteen hundred men at the time of the battle of Chancellorsville, when many of the absentees had returned.

"Great as was this evil among the Virginia regiments, it operated with tenfold force upon the cavalry of Hampton's brigade. Think of sending a man from Virginia to South Carolina, North Carolina, Georgia, or Mississippi to procure a horse. Recruiting camps were established in Virginia and in North and South Carolina, and every means which the cavalry commanders could devise were used to ameliorate this state of affairs. But the inevitable tendency was downwards; and in the last year of the War hundreds of men were gathered together in the "Dismounted Camp," or, as the men called it, "Company Q," in the vain attempt to realize good, but misplaced material. Special officers were appointed for these men, and the attempt was made to use them dismounted in various ways, but with no success. The men were disheartened. *Esprit de corps* could by no possibility be infused into such an assemblage. Every man looked and longed for the time when his horse might be returned from the recruiting camp, or when some other kind providence might remount him and return him to his comrades. The penitentiary could not be more loathsome to him than his present condition, and yet even this was better than to give up all hope, and consent to a transfer to the infantry or artillery.

"The want of proper arms and equipments placed the Southern cavalry at a disadvantage which can hardly be overestimated. At the beginning of the War the troopers furnished their own saddles and bridles. The English round-tree saddle was in common use, and sore-backed horses multiplied with great rapidity. After a time the Government furnished an unsightly saddle which answered a very good purpose; for although the comfort of the rider was disregarded the back of the horse was protected. Our best equipments were borrowed from our cousins of the North. The question of arming the cavalry was far more serious. Some of the more wealthy of the Virginia counties armed their cavalry companies with pistols when they were mustered into service, but whole regiments were destitute of them. Breech-loading carbines were procured only in limited quantities, never more than enough to arm one, or at most two squadrons in a regiment. The deficiency was made up, generally, by Enfield rifles. Robertson's two North Carolina regiments, which joined Stuart in May, 1863, were armed with sabres and Enfield rifles. The difference between a Spencer carbine and an Enfield rifle is by no means a mere matter of sentiment. Horseshoes, nails and forges were procured with difficulty; and it was not an uncommon

occurrence to see a cavalryman leading his limping horse along the road, while from his saddle dangled the hoofs of a dead horse, which he had cut off for the sake of the sound shoes nailed to them."

In one respect alone was the Federal cavalry superior, namely, in arms and equipments, for these were of the newest pattern. And yet, even in this respect, the advantage was questionable, for the Government issued an overwhelming outfit. The poor soldier was oppressed with his trappings and arms, and, mounted for a march with three days' rations for himself and his horse, with saddle and bridle, watering bridle, lariat rope and picket pin, nose-bag, carbine and its sling, revolver and its holster, ammunition for both in their receptacles, sabre and belt, he looked little like the trooper Détaille or De Neuville loved to paint. The most difficult thing a recruit had to do when ready for the march was to get into and out of the saddle, and a derrick, sometimes, would not have been a bad thing.

The regulars, arriving from their western fields, were at first pushed into the field by companies, then, reorganized, were so largely used as orderlies and headquarter guards as seriously to impair their efficiency, and as regiments, which were then numerically weak, were not united until 1863.

It has always seemed to me that they should have been filled up to the maximum and as a division, of three brigades of two regiments each, should have held in check, if not destroyed, the Confederate cavalry in those early days when volunteer regiments were no match for the rough riders of the South, who also possessed the immense advantage of fighting upon their own ground.

The regulars, in larger or smaller detachments during the first part of the War, did brave work; but they were almost always used in small bodies which were usually outnumbered by the Confederate cavalry, and their efforts were consequently unsuccessful. At Gaines' Mill a most gallant charge was made by a small body of the 5th Cavalry, a desperate diversion to enable a new line to be formed, which succeeded in its object at the expense of the cavalry,—a gallant and heroic service.

The volunteer cavalry, until 1863, took the field usually as regiments attached to separate commands; and also, occasionally, by brigades. Under good commanders, notably under Buford, it did some handsome fighting. There was no cavalry bureau at Washington charged with its organization or equipment, and particu-

larly there was no general having command over the whole cavalry to direct its detail and combine it for field work. Thus the regiments were not systematically recruited, or remounted, as the horses became used up or were killed. There was no combined movement of cavalry, and no separate cavalry organization. The officers commanding divisions and corps to which cavalry was attached, seemed greedy for as large a force of cavalry as possible, and very commonly used it up with unnecessary and thankless work. There were many defeats, great discouragement, and demoralization resulting from this abuse. As a rule success attended the Confederates, and it seemed doubtful if volunteer cavalry in the Federal Army was to be of any good.

Until 1862, in summer, in the Federal Army the cavalry was groping about for its place in the field while learning the elements of its duty. During the Peninsular Campaign, under change of commanders, it did nothing to gain a reputation, being hardly mentioned in despatches; while Stuart won a brilliant reputation by his raid around McClellan's army, and originated the "raid" which afterwards became such a feature in every campaign. Pope, in his campaign, exhausted his mounted troops by hurrying them hither and thither. If his cavalry had been kept on his flanks and always close to his enemy he would not have lost sight of him, and eventually found him in his rear. This short campaign illustrates most forcibly what I insist upon,—that the Federal cavalry at that time had no general who understood its use. On the contrary, it was used up and ruined in a service which not only gave it no rest to prepare for an emergency, but placed it where it could not even gain a reputation. Lee used his intelligently, and, with half the work, it did not only good service but gained a brilliant reputation.

During the Antietam Campaign the cavalry of McClellan's army did nothing worthy of it. It moved aimlessly about. At the battle itself the whole Division crossed the Antietam on the Sharpsburg pike about 8 A. M., and took a position close to Lee's centre at Sharpsburg, where he had concentrated about thirty-five pieces of artillery with which (at times entirely unsupported) he held the town.

Porter's entire corps, also, was within striking distance, but lay all day just out of fire on this road, and, among the lost opportunities of the entire war none was more conspicuous than this. General Lee spoke of the Federal cavalry, "with a bravery

worthy of a better cause," taking up this menacing position. Several times during the day the men mounted and sabres were drawn, as all supposed, to charge, but the men were dismounted again without attempting anything.

The artillery fire of Lee's guns was fierce, and, together with the fire of our own of probably double the same number, across the Antietam Creek, made a noise that was infernal. This fire lasted all day, and this division of cavalry lay here all day, losing a few men by artillery fire, but accomplishing nothing. McClellan permitted Lee to take troops from his right, while Burnside did not cross to relieve his sorely pressed left. And then, after Lee had with their help stayed the adverse tide on his left, he took them and others back and fought Burnside's troops when they did cross.

On both right and left there were natural obstacles besides Lee's veterans to McClellan's troops getting into position to attack. In the centre was no natural obstacle. The bridge was intact and securely held, the road excellent. It led straight to Lee's centre. Moreover it was already crossed by the cavalry, 4320 strong, and this force was within 500 yards of Lee's centre, well protected by the ground and all ready formed for battle. Antietam was my first great battle and I vividly recall the crossing of the creek. We suddenly came into the artillery fire before reaching the bridge and it seemed as if the whole ground was ploughed up by shells and the air full of them. The bridge was particularly exposed. On it as I crossed lay the dead bodies of the colonel of the 4th Penn. Cavalry and his horse. They had just been killed by a shell. The casualties were numerous here. But very soon after crossing cover was found for the 4000 cavalry, and could have been found for Porter's Corps had it crossed, and a better place to put in troops was impossible to find.

The morning after Lee had with perfect success crossed the Potomac, the cavalry rode down to the high river banks, looked across, stood and received the fire of twenty-seven guns in battery at Shepherdstown for a long time, and collected the very meagre leavings of Lee's army, a few abandoned wagons, a caisson or two, and other worthless trash.

During the rest of the autumn the cavalry of both armies was rendered almost useless by an epidemic called "greased-heel" among the horses. Yet Stuart, in whose command the same disease raged, managed to ride around McClellan's whole army

without any loss to his cavalry, capturing over a thousand horses and much other plunder, and causing our men much fruitless work. But, better than all that, he so added to his already great prestige that his cavalry was feared as masked batteries were at one time.

During the following winter, in front of Fredericksburg, the Federal cavalry did picket and scouting duty not merely on the flanks of Burnside's and Hooker's army, but kept open and protected the rear, and in fact all the country from Washington down to the Rappahannock, and all about Washington, a duty that required the utmost exposure, wear and tear; and at the same time added nothing to the glory of that ill-used branch of the service.

In the spring of 1863 came a great change, which, for the Federal cavalry, might be called an emancipation. During the winter Hooker reorganized the entire Army of the Potomac. The cavalry also was newly divided into brigades and divisions better officered than before. Probably at no time during the war was the Army in so good condition as in May, 1863. The cavalry had been ill-used during the winter, and the horses were not in good condition, but the discipline was excellent, the regiments well officered and fairly well drilled.

While not in comparatively such good condition as the infantry, the cavalry of Hooker's army had greatly improved and wanted but a dashing general to win laurels.

For nearly eighteen months the work had been scouting, picket duty and little encounters by companies or regiments, without any general leadership, without dash, enterprise, or success. How different in the Confederate cavalry! There, at the very outset, was an efficient force led to victory; and under such leaders as Ashby, Stuart, and Fitzhugh Lee, made to feel they could do anything. During this time they rode twice around the entire Federal Army, in front of Richmond, and in Maryland, each time with perfect success and almost with impunity, under J. E. B. Stuart, accomplishing excellent results in destroying and capturing, but particularly in learning that constant motion is the cavalry's forte, and boldness and audacity are its protection.

But younger officers were learning their duties, and the troopers were becoming educated to their work, and in the spring of 1863, under a new leadership, the Federal cavalry first asserted itself against the Confederate troopers at Kelly's Ford, and showed

itself at the battle of Brandy Station, June 9, 1863, fully a match for Stuart's cavalry, and never afterwards proved a contemptible foe.

I do not intend to say there were not gallant fights made by some cavalry commands, but that on the whole the result was thus far unsuccessful and unsatisfactory. Stuart and Fitzhugh Lee and Hampton were constantly making successful raids upon the cavalry lines of pickets and capturing men, horses and wagons. They had the prestige, or as it came to be expressed, "the bulge on us."

The battle of Brandy Station was a severe fight, in which the Federal cavalry, about ten thousand strong, crossed the Rappahannock on a reconnaissance in force, and attacked all Stuart's cavalry of nearly equal strength on his own ground. The artillery was freely used on both sides, and the number of guns was very nearly the same. After heavy and successful fighting all day the enemy was put on the defensive and made to develop his entire force and even to bring up his infantry. In the late afternoon our troops recrossed the river unmolested, having fully accomplished the object aimed at.

This was, for the cavalry, the turning point in the War. The Confederates were never met, before or afterwards, in such force. They here lost their prestige and never recovered it.

In rapid succession followed severe contests of the cavalry, successful for the Federals, at Aldie, Upperville, etc., June 17, 18, 19, 20, and engagements of more or less importance daily all through the campaign. The cavalry of both armies were in constant contact.

Ordered by Lee to keep on his right flank, and unable to break through the Federal cavalry, Stuart rode round its rear and crossed the Potomac between it and Washington, and, severed from him by the whole Federal Army, only joined Lee at Gettysburg on the second day of the battle.

General Lee has claimed that Stuart's absence caused him great inconvenience and perhaps ruined his campaign of invasion, Stuart's historian indignantly denies this, and apparently gives good reasons for doing so. Be this as it may, it is sure that during this campaign, in a series of almost daily encounters, the Federal cavalry came out best, not without getting roughly handled at times, but always making itself respected, and up to July 3d, keeping Lee's cavalry separated from his army and depriving him of its help when it was most needed by him.

During the rest of the summer, after Gettysburg, and until the middle of September, nothing very important was accomplished by the cavalry of either army although many little encounters took place.

At Culpeper (September 13) on the advance, Stuart's cavalry was met and defeated with a loss of three guns.

Later, in November, Meade crossed the Rapidan, and in the Wilderness met Lee at Mine Run in so strong a position that he declined to attack and recrossed without fighting a battle. In this move his cavalry had several encounters, opened the roads in advancing and brought up the rear in the retreat. It was well handled and beautifully manœuvred, and won the admiration of all who saw it, but no chance for great distinction occurred. This year developed the Confederate partisan.

The flank of Meade's army and his long line of communication by the Orange and Alexandria railroad were exposed to constant attack by Mosby's battalion, White's battalion, Company H of the Virginia cavalry—the so-called "Black Horse Cavalry"—and by other commands which operated in that district where the men were at home. These attacks, which, with little danger to the attacking forces were very sure of success, caused the presence of a large force of Meade's cavalry at Warrenton and other points on his flank and rear, besides a cavalry brigade at or near Centerville. The Federal forces accomplished little against Mosby and the other partisan battalions, but it allowed something like rest to Meade's cavalry, and guarded the flanks and rear against any attack from regular Confederate troops.

Meade used his cavalry better than any previous commander, and under him that branch gained largely in efficiency and prestige. Wintering in places where, with the least wear and tear, the flanks could be protected, and at the same time the men and horses could be drilled, it improved by good care and food during the winter of 1863–64.

Just before the campaign of 1864 opened, General Sheridan took command of the Cavalry Corps of the Army of the Potomac, reviewing each of its three divisions in turn. May 2, 1864, his cavalry crossed the fords of the Rappahannock, uncovered the roads on the south side, reconnoitred, and cleared the way until Meade and Lee were face to face. In doing this there was some severe fighting with Stuart's cavalry in which the Federal cavalry invariably had the best of it.

On May 9th, as the Wilderness offered no chance for mounted troops, began the raid to Richmond and a series of bloody engagements which ended at "Yellow Tavern" and "Richmond." Stuart's cavalry was very roughly handled and he himself was killed. This loss to the Confederacy was never made good. There were good leaders amongst his brigade chiefs, notably Fitzhugh Lee, but Stuart had been the leader for nearly three years. Nobody doubted his right to the place, and after his death nobody quite filled it. He died at a good time for his own fame, for not even he could have changed the inevitable result that followed. It was no discredit that it was so. The Confederate cavalry fought long and well. The material for the rank and file was constantly deteriorating. Their prestige became always comparatively less as it increased on our own side. Now we had a leader, and not one only. From inferior grades had sprung up a number of able commanders of divisions, brigades and regiments. Casualties in any rank with a change of personnel did not change the efficiency of organization.

The Confederate cavalrymen became better armed as the War went on, largely from captured weapons, but their fine well-bred horses went, never to return, and in 1864 they were not so well mounted as their Federal opponents. Their granaries were laid waste and a general decay set in that could not be stayed. All this was not without its consequences; and we find all through the rest of the War an almost invariable success attending the Federal cavalry in its battles.

Some reverses were inevitable. Success urges always to more dangerous deeds, and sooner or later to the impossible. Such was Wilson's raid to destroy Lee's southwestern communication with Petersburg. Sheridan's Trevillian Station raid resulted in hard fighting and equal honors. It did irreparable damage to Lee's cavalry, for the losses of men and horses, particularly the latter, could not be replaced. The Federal cavalry accomplished little else that was tangible.

The desperate attempt of Early to make a diversion in favor of Lee, by invading Maryland, led to the "Valley Campaign," and Sheridan took with him the largest part of the cavalry, which in turn caused Lee to send most of his to oppose it.

Here was a better country for cavalry than we had seen ever before during the War, and here the supremacy of the Federal cavalry was most marked. Here for the first time did the cav-

alry attack infantry in line on a large scale. By small bodies this had been done before on both sides.

At the battle of Winchester the Confederate division of General Wharton was ridden over in perfectly open country by our cavalry, and almost the entire division—a small one—was captured.

I will go into this something in detail, as it has been frequently asserted that cavalry never during the War accomplished this feat.

At the end of August, 1864, Sheridan, in obedience to his instructions, had withdrawn his army to Halltown, near Harper's Ferry, for the reason that Anderson's Division of Longstreet's Corps had come to reinforce Early. The Confederate cavalry was pushed close up.

Sheridan while at Halltown wanted to have prompt information of any movement of this division, and accordingly Colonel Lowell, in command of the Reserve Brigade, ordered, in the early morning, an attack by two squadrons of the 2d Massachusetts Cavalry upon the infantry pickets. The attack was made at the same hour and the same place on two successive days. Each morning the charge was successfully made upon what proved to be a South Carolina brigade, and the greater part of a regiment was captured most gallantly. On the 16th of September the Third New Jersey Cavalry—a recently organized regiment — captured an entire infantry regiment (the Eighth South Carolina, of Conner's Brigade, colors, colonel, officers and men) in front of Winchester on the Berryville pike. These small affairs were duly heralded and inspired the cavalry with daring.

The battle of Winchester was fought on the 19th of September, Grant allowing Sheridan to attack Early, after going to meet him at Charlestown. Grant says, speaking of Sheridan, "I met him at Charlestown and he pointed out so distinctly how each army lay, what he could do the moment he was authorized, and expressed such confidence of success that I saw there were but two words of instruction necessary—'Go in.'"

At this time Early, with his inferior force, had his army spread out between Winchester and Martinsburg. His communications were upon a splendid road—the valley pike—and consequently he could concentrate rapidly, but his extreme divisions were twenty-two miles apart.

Sheridan was at Berryville, eight miles from Winchester, his army concentrated and fortified with breastworks along part of

the line. The road to Winchester was fairly good, but the Opequan, with the steep banks on the east side, lay between and had to be crossed. A difficult and narrow defile lay between the Opequan and Winchester, consequently it was not easy to concentrate rapidly in front of Winchester, though the distance was not so great as that of Early's most distant division from that place.

Sheridan consequently sent all his cavalry but one division, which protected the left flank, down to Summit Point to cross there, and then march up the road to Winchester and come in on the enemy's flank. If the troops could get into position quickly enough, Early's divisions could be beaten in detail and perhaps the greater part captured.

A very slight obstacle of water will cause great delay, and the little stream of the Opequan, not two feet deep, proved no exception to this rule.

Early soon found out what was going on, and for hours it was a race between the armies to get into position, one to attack and the other to defend Winchester.

The ground becomes open and quite clear as the town is approached, and Winchester is surrounded by rising ground which commands all the approaches. Here most of Early's infantry was posted. The battle was fought at most points in perfectly open country. The movements of the Confederate troops about the town could be plainly seen, as they were placed by the officers behind walls; and in some places were slight fortifications with artillery. This was the case where Wharton's Division was in line late in the afternoon. As the troops came up slowly, Sheridan, impatient of the delay, attacked with the 6th and 19th Corps before either Crook's 8th Corps or the cavalry had come up.

The attack was delivered just as Early had got his infantry in position. On his left he had placed Gordon's Division in a piece of woods at a considerable angle with his front. The horse artillery was in battery on our right flank and poured in a very severe fire as our line advanced. The 6th Corps, attacking on the left and centre, was successful with its 2d Division on the left. On the right, the 3d Division, 6th Corps, and on the extreme right the 2d Division, 19th Corps were repulsed and had to retreat, but the enemy made no attempt to follow up his advantage at this point. The reserve, Russell's splendid 1st Division, 6th Corps, advanced and restored the 6th Corps line, Russell being killed;

and on the right, Dwight's 1st Division, 19th Corps, came into line and put things to rights there. Meanwhile the 8th Corps was coming up, and the cavalry in the distance was engaging Early's cavalry. His flank being thus threatened by our cavalry, Early withdrew the horse artillery and drew in Gordon's Division, closing in nearer to the town.

Torbert, in command of the Federal cavalry, was driving Fitzhugh Lee steadily, slowly at first, then more rapidly, and when the attack in front of Winchester was renewed with the 8th Corps, the cavalry came up in chase of Fitzhugh Lee, whose cavalry rapidly and energetically retreated towards and through the town.

Our cavalry in pursuit, in line of battle more or less disturbed by the speed of pursuit, came through the open fields until they suddenly saw in front of them Wharton's Division of infantry in line protected by a small fortification and by artillery. Rapidly taking in the situation they charged the line at once and carried all before them, riding over Wharton's small division, and capturing many prisoners. I went over the ground the next morning at daylight, and particularly examined the place where this successful charge was made. Where Wharton's Division had been in line, was a slight hill sloping away north; a large house was on his right, and in front of it a slight work in which had been apparently two pieces of artillery. Wharton's Division had been in line to the northwest from the house facing about northeast. Their arms lay in piles, or rather windrows, where they had dropped them when the cavalry struck them. The plain across which the cavalry had charged was dotted with dead horses, and many dead cavalry soldiers lay about; one, that I particularly noticed because one-half of his head was shot away down the line of his nose so cleanly that not a drop of blood was visible, lay just in front of where a gun had been. I judged him to have been killed by the last discharge of the gun when the soldier was close to it trying to capture it. An officer of Colonel Lowell's Brigade says that Colonel Lowell ordered him to charge this line of infantry and the guns; but before he could accomplish it—having to collect his regiment—another body of cavalry had done the work. Wharton's Division was at this time the extreme rear guard, had been working hard all day, and was undoubtedly demoralized. Early's troops were going to pieces behind them. Defeat was inevitable and imminent. On account of all these things they were not a formidable force. They were a small

division, in line of battle, a good line admirably situated to deliver an effective fire. Two guns were there and were used. But the cavalry saw them only to charge them instantly, and they did it well. In his book,—"The Shenandoah Campaign,"—Pond says nothing of this.

We captured in the battle of Winchester five guns, some colors, and about 2000 prisoners, mostly of Wharton's Division. Most of Sheridan's cavalry followed up that of the Confederate Army and drove it up the little valley, or Page Valley as it is called, and was not present at the battle of Fisher's Hill two days after Winchester, where Early's infantry and artillery were drawn up behind works. Averell's Brigade, however, was there. In the afternoon he went into camp behind the right of Sheridan's line without orders, and when Sheridan by a wonderful *coup d'œil* had seen his opportunity, and turned a reconnoissance into a real attack, he sent for Averell to follow up the victory. Finding he had gone into camp he relieved him on the spot.

Recalled to the main army, Sheridan with his cavalry pressed Early back beyond Staunton in a succession of eager but small engagements.

The Confederate cavalry, unable to cope with Torbert's bold riders, was reinforced by another brigade under General Rosser. Rosser on taking command boastingly proclaimed what he would do. What he did was to be fairly dashed out of the way October 9th, at the battle of "Woodstock Races," as our men called it. His squadrons were ridden over and pursued twenty-six miles at a gallop. Rosser's artillery was captured entire, guns, horses, men, and even officers. Rosser's headquarter wagons were taken, or, as Sheridan reported it, "everything he had on wheels," and Custer came to headquarters wearing Rosser's best uniform.

Fitzhugh Lee was wounded at Winchester, and Rosser soon after assumed command of all the cavalry. He was not a West Point graduate,* but was so well thought of that he was selected to fill Fitzhugh Lee's place, and was heralded by somebody at the South, in advance, as "the Saviour of the Valley." He kept this title afterwards, and I fancy it proved somewhat distressing to him.

General Early's own report to General Lee of this battle gives a pathetic account of his woes, and an excellent and impartial account of his cavalry. It is as follows:

* He was at West Point about four years, and resigned at the outbreak of the War.

"This is very distressing to me, and God knows I have done all in my power to avert the disasters which have befallen this command; but the fact is that the enemy's cavalry is so much superior to ours, both in numbers and equipment, and the country is so favorable to the operations of cavalry, that it is impossible for ours to compete with his. Lomax's cavalry is armed with rifles, and has no sabres, and the consequence is that they cannot fight on horseback, and, in this open country, they cannot successfully fight on foot against large bodies of cavalry; besides, the command is and has been demoralized all the time. It would be better if they could all be put into the infantry, but, if that were tried, I am afraid they would all run off."

The Confederate cavalry was fairly used up and unable to take the field in any considerable force and they made no show at the battle of Cedar Creek, October 19th, being brushed away almost ignominiously by Custer early in the day. Not so the Federal cavalry, which came into line with the infantry (Custer on the right and Merritt and Lowell on the left, the whole under Torbert). On both flanks they fought infantry, and Lowell, particularly, put in his men mounted against Kershaw's Division of Longstreet's Corps which was not merely in open country but was protected by stone walls.

For hours did our cavalry attack and keep back Kershaw's fine division, and they charged up to the stone walls, and here Lowell lost his life, and many brave officers and men were killed and wounded.

Charles Russell Lowell was a man made by nature for a cavalry leader. During the eight weeks of the valley campaign his command, the regular brigade, composed of the 1st, 2d and 5th U. S., and 2d Mass. Cavalry, was almost daily engaged; and at one time, for twenty-four consecutive days, was in a fight of more or less importance. He had during this period no less than fifteen horses killed under him. What he did so conspicuously all the rest did in high degree.

The losses were severe, the glory great, the success splendid. Sheridan had picked Lowell out almost at once as an officer of exceeding merit.

Cedar Creek may be considered the end of this campaign, for no fighting of any importance followed.

In the spring of 1865, Sheridan's cavalry rode down to Grant before Petersburg, sweeping up all that remained north of the James, capturing the last guns left, and putting a military quietus on General Early. Early's undoubted ability as a soldier, his perseverance and courage, deserved a better fate.

Arriving before Petersburg March 27th, Sheridan was at once put on the left flank with his cavalry, and how he helped to defeat General Lee is a matter of history.

At the battle of Five Forks the cavalry fought infantry besides what remained of the Confederate cavalry.

In the final and successful attack in that battle, it was the 5th Corps, particularly Ayres' Division, that turned the flank of the breastworks and made the victory complete; but on the front, the cavalry, before the arrival of the 5th Corps, drove all the Confederate troops behind their works and held them there, and later, at the final battle, rode over the breastworks and followed up the victory.

General Pickett, commanding the Confederate infantry at Five Forks, said that while giving his final orders that day just behind the breastworks, a Federal cavalry soldier mounted on a mule, jumped over the works and called on him to "surrender and be damned."

No one can doubt to-day that the final surrender at Appomatox was due very largely to the cavalry, which constantly, during those splendid days, pressed against the Confederate Army in front, flank, and rear; never hesitating to inquire whether the force in their way was cavalry or infantry.

It was only when General Lee found Sheridan's cavalry finally between his army and its supplies at Appomatox, that he realized the end had come, and surrendered. Whether the cavalry directly caused the surrender or not, it is safe to say that the surrender would not have occurred then and there but for the boldness, dash, and perseverance with which Sheridan with his splendid force attacked Lee's army, and relentlessly followed his retreating columns.

In the Army of the Potomac were, in 1863, about forty regiments of cavalry, originally of 1200 men and horses each. In 1864, there were about forty-two. As these were recruited from the States in which they were enlisted, and as the desire was to recruit as many regiments as possible, rather than keep full the regiments already in the field, it resulted that these soon became small.

Seldom could one be found, unless very recently put in the field, with over three hundred men. And many were smaller. To say that this was a very faulty way of administration, falls far short of a proper condemnation. It prevented efficiency in those

regiments which were best disciplined, for want of strength. It not only brought into the field regiments which were useless because wanting in drill and experience, but it usually furnished plenty of inexperienced field officers of high rank who would by mere rank come into prominent command, unless specially got out of the way.

This was managed better in Lee's army, where the companies of old regiments were kept filled up, instead of creating new and consequently useless battalions. Their regiments were almost invariably stronger than ours. A comparison by number of regiments only gives an incorrect idea of the strength of the cavalry in the two armies. Lee had about thirty-six regiments.

No one can appreciate the many sources of demoralization constantly at work with cavalry unless he has served with it. The man and horse are essentially one, and any illness of either affects both. A false fold in the horse's blanket may ruin him. Epidemic diseases may for months paralyze the entire force. In the autumn of 1862, after Antietam, a disease called "greased heel" destroyed the effectiveness of all McClellan's cavalry, and indeed artillery too, for many weeks. The "glanders," which broke out in January, 1862, in South Carolina, was never eradicated from my own regiment during the War.

It has been thought by many infantry soldiers, men and officers, that the cavalry service is easy and not dangerous. Joe Hooker's exclamation, "Who ever saw a dead cavalryman," was hugely relished by the infantry.

I have already shown that for want of experience and training and of proper cavalry generals until June, 1863, the cavalry of the Army of the Potomac never had a fair chance to show its prowess. When it did, later, it improved it nobly, and made up for former want of opportunity, and many of the cavalry battles were remarkable for the losses.*

Certainly General Hooker would never have made his famous remark a little later, nor was it deserved then.

As to the work done by the cavalry, it was most severe at all times, and was never remitted, even in winter. The same

*At Aldie, the First Mass. Cavalry lost, in about an hour, one hundred and sixty-one officers and men out of three hundred. During the Richmond raid, in 1864, the same regiment lost eight out of fifteen officers, and nearly half its men in eleven days, without fighting a general engagement, but constantly engaged in small affairs. It is not likely that these figures are at all peculiar to this regiment.

terrible picket duty and patrol, with constant skirmishes and hard marches, continued the whole year, and such a thing as a permanent camp behind works was unknown. Tours of picket duty sometimes continued with the same men, in winter, for two weeks at a time. During the winter of 1863–64 the men averaged more than half their time on picket, and raids and reconnoissances were extra. The vedettes were on post alone (not by twos and threes) two hours at a time. During the winter of 1862–63, when Hooker's army was in front of Fredericksburg, the picket duty was something horrible. The soldiers had only shelter tents, the horses no protection. The roads were in places two feet deep with mud, snow and water. Sometimes on relieving the vedettes, horses would be found dead from exposure and hunger.

Only oats could be taken on picket as forage, and the horses were always kept saddled. In their hunger they ate off each other's manes and tails, and a more miserable spectacle than the cavalry horses during this winter could hardly be found. They died by hundreds.

The daily work of the cavalry soldier cannot be called easy, even when in camp. Besides all the ordinary duties of the infantry, is the care of the horse. And the soldier has not only his own horse to clean, but the horses of all the men on camp guard, the sick and any on extra duty. The forage is to be hauled, and all the horse equipments are to be kept in order, besides carbine, pistol and sabre.

During a campaign, at the end of a long march, before a tent is pitched or any attempt at individual comfort can be made, forage must be procured, frequently from a distance. The horses must be unsaddled, cleaned twice a day, and watered twice a day in camp. "Stable call" lasts two hours every day. In fact the cavalry soldier is never at rest, and during an active campaign all these things must be done in intervals of fighting.

I have known the horses to remain saddled fifteen days and nights at a time, and only a part cleaned and fed. The only sleep the troopers got during the first two weeks of May, 1864, was on the ground in front of the horses, holding the bridles in their hands, and officers had to do the same. The troopers acquired a faculty of sleeping on horseback on the march.

As to the comfort, there can be no comparison between cavalry and infantry service, none as to the amount of work. But there is something very attractive in the service in spite of all.

It is more venturesome and varied. Here to-day, there to-morrow. More chance for foraging. Sometimes better food, never so much hard-tack and pork, but not unfrequently great hunger and want.

During the Antietam campaign, from September 2d until the 20th, neither forage nor rations were issued to the cavalry. The troopers fed upon green corn, apples, and past recollections, with an occasional feast at some farmhouse. The sauce of hunger was always plentiful and strong. The horses fed on green cornstalks almost entirely, a very poor food by the way, and supposed to have much to do with producing the epidemic of "greased heel," which broke out among the horses soon after.

In many respects the equipments were faulty and senseless. Cavalry is supposed to effect surprises. It should be able to march silently. Why, then, the jingling sabre? The metal scabbard and metal fastenings make the noise. They also keep the sabre dull, invite rust, and add to the soldier's work. A wooden or leather scabbard lined with wood is better, would be noiseless, keep the sabre bright and sharp, for the sabre is *supposed* to be sharp.

Of the horse equipment much was unnecessary. The lariat rope and picket-pin were born of service on the plains where they were necessary in feeding the horses on grass. Parts of the saddle had the same origin, as for example the hooded stirrups. The soldier had too many arms. The Confederates, instead of arming the entire regiment with rifles or carbines, had sharp-shooter companies, thus leaving a part of the regiment with only pistol and carbine. Until towards the close of the War their carbines and rifles were muzzle-loading. By that time they had captured enough breech-loaders to largely arm their reduced numbers with them. The Federal cavalry had breech-loaders of various systems, principally Sharp's, and the Michigan brigade had the Spencer magazine seven-shooters,—"coffee mills," the Confederates called them. The different carbines were of different calibres and with a variety of ammunition that caused confusion.

Compared with this the Confederate outfit was meagre and simple, but strong in essential points. I have spoken of their well-trained and well-bred horses. When my own regiment was mounted, the horses were bought of contractors and were said at the time to include all the vicious and unmanageable animals in the State of Massachusetts. They were a motley lot, and few had ever been ridden. Generally "Canuck," as the Canada horse is called; short legged animals with thick mane and tail, about fif-

teen hands high. They proved excellent animals and seemed able to endure hardship and hunger about in proportion to their Canadian blood. These "Canucks" are supposed to be a Norman French horse degenerated in size,—good tempered and exceedingly enduring. When they could not get hay they would eat the bark of trees, leaves, almost anything,—and would thrive where horses of some other breed would starve. The last of these Massachusetts horses in the regiment was stolen in crossing the Pamunky at Hanovertown in June, 1864, much to the grief of his rider.

The Confederate cavalry was efficient, well mounted, and led with dash and enterprise from the very start. It obtained at once the prestige and held it until June, 1863. A history of General J. E. B. Stuart, written by his chief of staff, Major McClellan, has lately appeared. He gives incidentally an account of most of the cavalry engagements during Stuart's command up to the fight at Yellow Tavern near Richmond, May 11, 1864. He states all this very fairly, and undoubtedly aims at correctness. He has some wonderful accounts of Stuart's feats and those of his cavalry, and has slurred over some of those of the Federal cavalry and altogether omitted others that we like to remember.

One usually associates success with victory, but after reading accounts of the War from many Southern sources, books and speeches, a feeling of astonishment remains that after such a wondrous and almost uninterrupted series of defeats the Federal Army should not have been wiped off the face of the earth. It would seem to be by getting whipped that we finally won. This is particularly true of most Southern accounts of their cavalry. The fact is that no man can see for himself all of even a small engagement, much less all of a big battle. In getting his information he naturally hears more of the successful than of the disastrous parts of every battle, and is satisfied with that.

It is only on this principle that we can account for some of the reports of battles we see in books. While easily finding glowing accounts of engagements where we were beaten, I have often turned for refreshment to find an account of some other affair where we were victorious, to discover that the author had omitted all mention of it.

Our Southern friends in the cavalry certainly fought well, and they are, some of them, evidently as strong with the pen as with the sword, notably von Borcke, Gilmor and Mosby.

General J. E. B. Stuart not only commanded the Confederate cavalry,—he *made* it.

At Chancellorsville, after Stonewall Jackson's death, he commanded his corps; and showed himself a general of very high order. Fitzhugh Lee, was certainly next after Stuart, if not his equal. He was called to the chief command at a time when the task was desperate.

On the Federal side, Sheridan was by all odds, first. There was a great number of distinguished lieutenants, particularly of those called by him to fill high commands.

The Confederate cavalry started its career in pride, strength and success. The Federal cavalry in confusion and inefficiency, and had to make itself. This was naturally not done in a day, nor did any leader of magnetic influence call out its powers. It was done painfully, slowly, and with many a humiliating experience. Hard knocks and defeats taught it vigilance, and the successful officers grew up with it and out of it.

The Federal cavalry for a long time was not fortunate in its leaders. Perhaps it is fairer to say that the faulty system, or want of system, prevented the leaders from accomplishing anything. A cavalry general is not easily found even in trained armies, and none appeared in the Army of the Potomac to hasten the natural process.

Sheridan, who was the most brilliant commander the War furnished on either side, was not trained in the U. S. cavalry, having been an infantry officer and for some time serving as quartermaster.

I find in a most interesting book on cavalry, by Bismarck, (Lectures on the Tactics of Cavalry, 1818) the following:

"A sufficient number of able generals of infantry has been found at all times, in all armies, but very rarely *one* of cavalry.

"Cavalry will probably in future times no longer occupy a place in line of battle, until some eminent talent on a throne discerns its strength and out of the whole body of officers places the ablest, most resolute, steady and boldest at its head, and in future wars overcomes those nations who, following the spirit of our time (ever less productive of warlike characters), neglect the cavalry.——But all commanders of armies have not known how to derive advantage from cavalry.

"The secret of producing great effects by cavalry lies in the *personal qualities of the leader*. Striking instances are recorded of the opposite effects produced by different commanders upon the same troops. When Murat upbraided Junot for his inaction after crossing the Prudisi, Junot alleged in excuse that he had no orders to attack,—that his Wurtemberg

cavalry were shy, etc., that they could never be brought to charge the enemy's battalions. These words Murat answered by deeds. He rushed on at the head of the troops, who, with a different leader were quite different men;—he urged them on, launched them against the Russians, overthrew their skirmishers, and then returning to Junot, said,—'Now finish the business. Your glory and your marshal's staff are before you.'"

A similar anecdote is told of Colonel Rousset, an officer of Louis XIV., and Captain Churchill, afterward Duke of Marlborough, at the siege of Nimeguen (1672). On this occasion the French colonel had been obliged to abandon a post. Turenne, who witnessed the retreat, betted that Churchill with half the force would regain it. He gave him the command, and after a desperate struggle the future duke, in presence of the whole army, recovered the position.

Bismarck says, apropos of this principle, that

"In these wars (1756) amongst other armies were actions of single cavalry detachments and regiments, worthy of being handed down to military posterity. But there was nothing done upon a large scale. There was but one Seidlitz."

General Sheridan was selected by General Grant on this principle, and fully justified his intelligence. Under Sheridan only did the Federal cavalry gain the prominence it deserved.

It is not without interest to notice the remarkable number of distinguished officers of the Confederacy who served in the U. S. cavalry before 1861, most of whom were always cavalry officers. General R. E. Lee, A. S. Johnston, J. E. Johnston, Kirby Smith, Hardee, J. E. B. Stuart, Fitzhugh Lee, W. W. Loring, Van Dorn, G. B. Crittenden, J. B. Hood, Field, Evans, G. H. Stuart, R. B. Ewell, and more of less note.

In the Federal Army the list is not so long nor so remarkable, John Sedgwick and George H. Thomas being the most distinguished.

My sketch is of necessity very imperfect, as, to be general, it has had to be greatly condensed. I trust it may have illustrated to infantry listeners some peculiarities of the cavalry. To cavalry listeners I almost feel I owe an apology, for saying so much that is trite, and particularly in seeming to labor to prove propositions that to them must be self-evident.

THE THEORY OF DRIFT OF RIFLED PROJECTILES.

By LIEUTENANT G. N. WHISTLER, U. S. A.,

Fifth Artillery.

I DO not intend to discuss the gyroscopic theory of the drift at all, but will simply ask the believers in this theory, to reply to the following questions.

1. Why does the drift increase with the velocity of rotation? We know that the velocity of rotation in azimuth of a gyroscopic top increases as the velocity of rotation of the top decreases.

2. Why does the drift increase with the diameter of the projectile?

3. Why does a cylinder tend to drift to the left when fired from a gun with a right handed twist?

4. Why does a blunt pointed projectile such as was at one time used in small arms, and also in the Parrott gun, drift less than a sharp pointed projectile?

These are some of the observed phenomena which your theory must explain.

Without attempting to discuss the gyroscopic explanation, I offer the following Theory of Drift, and invite discussion of the same by our Artillery experts.

THE THEORY OF DRIFT.

Assume a cylindrical projectile fired from a gun having right-handed rifling. It is admitted that the point of the projectile will usually be above the tangent to the trajectory, and, therefore that the resultant air resistance will be applied to the under side of the projectile.

Let R — Radius of Cylinder.

Let V — Velocity of translation at any point of the trajectory.

Let v — Angular velocity of rotation about the longer axis, at the same time.

Let A — Angle of inclination of axis of projectile with the tangent of the trajectory.

Then R. v. = Surface velocity of rotation—
and [R. v. sin. A] = Surface velocity of rotation in the direction of the tangent.

The resultant atmospheric resistance applied to the right-hand side of the projectile, will be some function of (V + R v sin. A), and the resistance on the left side will be some function of (V — R. v. sin. A), the right side turns toward the atmospheric resistance, the left side turns from it. Therefore, the rotation of a cylindrical projectile (right-handed twist), increases the atmospheric resistance on the right side and decreases it on the left. And as the projectile will move along the line of least resistance, this cylinder will drift to the left, its axis remaining parallel to the line of fire.

If the cylinder be given a left-handed rotation, instead of right-handed, the least resistance will be on the right side and the projectile will drift to the right. *Thus a cylinder should drift against the rifling*, which experience has shown that it does.

A CONE.

Assume *a cone* fired point forward, from the same gun, right-handed twist, the base of the cone having the same diameter as the cylinder previously considered.

Let F = Atmospheric resistance on right side,
and F′ = Atmospheric resistance on left side.
Then F = f (V + R. v. sin. A)
and F′ = f (V — R. v. sin. A)
and D = F — F′.

Then D is the difference of the atmospheric resistances on the two sides of the projectile, and may to a certain extent, be taken as a measure of the probable amount of Drift.

For the base of the projectile the conditions are the same as for a cylinder. D. will be the same, and the base will drift the same distance to the left, as did the cylinder. For any other point of the projectile the tendency to drift to the left becomes less and less as we approach the point.

As we approach the point, R. approaches 0. and hence D. approaches 0. and the tendency to drift decreases. At the point, R. = 0. and therefore F = F′ and D = 0. and the point has no tendency to drift at all. The result is that the projectile assumes a position inclined to the line of fire, point to the right; the point remaining in the line of fire the base drifting to the left. This

brings into play a deviating component of the atmospheric resistance which carries the projectile bodily to the right.

The reverse of this is true if the cone is given a left-handed rotation.

Therefore a cone should drift with the rifling.

AN ORDINARY PROJECTILE.

The ordinary projectile consists of a cylindrical body which tends to drift against the rifling, and a conical point which reduces this tendency to zero at the apex. The result is to incline the projectile to the line of fire, point to the right in case of a right-hand twist, and *vice versa* for a left-handed twist. *Therefore an ordinary projectile drifts with the rifling.*

TRUNCATED CONE.

In the case of a truncated cone, it is evident that the entire projectile will drift against the rifling at first, but the base will move faster in that direction than the point, the diameter being greater; this will bring into play a deviating component of the atmospheric resistance which will carry the projectile *with the rifling*, but as the angle of inclination will not be as great as in the case of the cone, the drift will be less. *Therefore a blunt pointed projectile should drift less than a sharp one.*

$$D = f(V. + R. v. \sin. A) - f(V - R. v. \sin. A)$$

It is evident that D increases with v therefore, whether we are considering the drift of a cylinder, cone or projectile,—*The drift should increase with the angular velocity*—which we know it does. It is also evident that D increases with R.—*Therefore the drift increases with the diameter.*

We have a most beautiful illustration of the truth of this theory in the modern curved ball pitching in the game of base-ball.

The "In-curve," so called, is produced by rotating the ball about a vertical axis, giving it a right-handed twist. In this case the least resistance is on the right side, and the ball should curve to the right. *It does.*

The "Out-curve" is produced by rotating the ball about a vertical axis, giving it a left-handed twist. The least resistance is on the left side; it should, therefore, curve to the left. *It does.*

The 'Down-curve" is produced by rotating the ball about a

horizontal axis, turning downward; the least resistance being on the lower side it should drop. *It does.*

In the "Up-curve" the ball rotates upward; the least resistance is on the upper side; it should rise. *It does.*

Another point in ballistics is worthy of note.

Experience has taught that wind deviations, in left winds, do not agree with those obtained in similar right winds. This may be due either to an increase of wind effect or to an increase of drift due to the rotation of the projectile. All our guns have a right-handed twist, therefore in a left wind (that is a wind from the left) the lower side of the projectile is turning toward the wind, and the upper side from the wind. This lifts the base, and decreases the sin. A. and therefore F approaches F′ and the drift is decreased. In a right wind the upper side is turning toward the wind, this lowers the base, increases sin. A. and therefore the drift. It is also evident that the range will be affected by this change of the value of the angle A. My own experience, which however is not as yet sufficient to express a positive opinion; is that winds from the left decrease the range, and winds from the right increase the range.

In conclusion permit me to say that it appears to me to be going entirely out of the way to introduce the gyroscope to explain the cause of drift. The only similarity between a projectile and a gyroscope is that they both rotate about an axis with a predetermined velocity. There is, however, one marked difference which I have never seen noted. The rotation of a gyroscope neutralizes the action of gravity; the rotation of a projectile does not. A shot fired from the top of a mountain in a horizontal direction will fall to the ground in the same time whether fired from a rifle or a smooth bore.

SOME OF THE ARTILLERY DIFFICULTIES LIKELY TO BE ENCOUNTERED DURING THE NEXT MARITIME WAR.

By CAPT. JAMES CHESTER, U. S. A.,
Third Artillery.

TIME was when one would hesitate to proclaim himself a skeptic. During that age of intolerance when the only educated men exercised dominion over the bodies as well as the souls of the people, skepticism was a crime of the deepest dye. Learning was dogmatic, arrogant, intolerant, and skepticism concealed itself in obscurity. It would be a mistake to assume that it did not exist, for much of the dogmatism of the day was difficult to believe and none of it was easy to understand. But toleration dawned at last, and skepticism stepped boldly into the sunlight.

The skepticism of the age to which we refer was chiefly directed against religious dogma. Science had just entered the arena of controversy, equipped in an armor of so-called facts, and, for a time at least, seemed to have the best of the contest. Dogmatism became dumb and science exceedingly noisy. It passed from the condition of inactivity through that of apology and to that of aggression in a comparatively short period of time. From Bruno and Galileo to Darwin and Huxley science advanced steadily and positively, and under the last named apostle boldly set up for a god, the religion or worship of which was known as philosophy.

But science was not so safe as it seemed. Its armor of facts was found to be defective, and skeptics began to be skeptical of their own skepticism. Science failed to furnish its followers with absolute truth, and men of boldness and penetration began to question its infallibility. Literary men, with poetic insight, painted it in such glowingly correct colors that we feel compelled to quote the words of one of them. Byron says in "Manfred":

> "Knowledge is not happiness, and science
> But an exchange of ignorance for that
> Which is another kind of ignorance."

Solomon had found it to be vanity and vexation of spirit, and a greater than he had declared that the wisdom of this world was foolishness.

We can afford therefore to be called a heretic in such company. Any one who has watched the progress of science attentively, although unaided by the insight of the poet, or the guidance of the higher light, cannot help observing the instability of its teachings. The facts of yesterday become the falsehoods of to-day, and progress is, as Byron described it, an advance from ignorance to ignorance.

We live in an age of education. The printing-press has brought knowledge within the reach of every one that can read, and the world is drunk with wisdom of a certain kind. Education has come to be a study of text-books. The mind of the learner is crammed with other men's ideas, which it is powerless to digest, and ability is measured by the amount of such stuff the man's memory will retain. And nowhere is this evil greater than in the military profession.

A master of the Art of War appears a genius, albeit unconscious of his powers, and in the true spirit of the skeptic questions the teachings of the text-books. Of course he meets at first with ridicule from those who, later on, will worship round his throne; but for a time he is a heretic and ignoramus. But when success has signed his warrant and sealed it well with blood, then he is recognized and imitated. His methods, or what to purblind mediocrity appear to be his methods, are written up and crammed into the craniums of students of the art. And so Frederick's methods and Napoleon's methods were formulated into systems which embryotic leaders were required to learn and taught to imitate. The fact that Frederick's system without Frederick was like Frederick's body after his spirit had fled was never dreamt of. Still, the likelihood is that Frederick, or Napoleon, or any other master of the military art whose system has been formulated, would, if he were alive, be the first to repudiate the system attributed to him. He had no system. He acted thus and so because the conditions of the problem were thus and so. Had the conditions been different, he would have acted differently. His art consisted of two elements, the ability to diagnose correctly, and the spirit of command; neither of which can be acquired.

A period of peace is always a period of theorizing in military

matters. Recent campaigns are written up; the methods of successful commanders are formulated and military students are drenched with the decoction, and when they can retain a fair proportion of it they are declared to be fitted for command. They have learned the methods of the masters and are led to believe that these methods are immutable; that they are scientific deductions which have stood the test of practice and may therefore be followed with safety. But any greasy mechanic may upset the whole system any day. The Art of War, if the formulas which are put forth are the embodiment of that art, is at the mercy of millions of non-combatants. The inventor of a machine-gun, a smokeless powder, a range and position finder, or any useful military thing, throws his contribution into the military cauldron and the character of its contents is instantly changed. The methods of attack and defense have to be reconstructed, and the Art of War, or what is supposed to be the Art of War, rewritten. Success in the next succeeding war will depend upon the ability to grasp the meaning of the new conditions, and not upon familiarity with the old.

That department of war which is known as sea-coast defense, and which is the special province of the artillerist, has been sadly neglected of late years. So far as it is concerned the world has been at peace for a quarter of a century. The most recent examples, which might have been profitably studied, have been wholly overlooked, and the profession, or such members of it as have condescended to give the subject any consideration at all, have devoted themselves exclusively to theorizing. That we may not be chargeable with the same offense, we propose to direct your attention for a few minutes to those latest examples, which are all the more interesting to us, because they are part of our national history, and events within the memory of many of us.

The capture of Forts Walker and Beauregard which guarded the entrance to Port Royal harbor. The passage of the forts at the mouth of the Mississippi, the passage of the batteries at Vicksburg, and the forcible entry into Mobile Bay, are the latest examples of successful attack upon, or passage of sea-coast defenses. If these events had occurred in Europe there would have been no end of theorizing on the lessons to be drawn from them. Unfortunately, or fortunately, as you please, they were incidents of our War, and so overshadowed by events which, rightly or wrongly, were deemed to be of greater importance, that they entirely escaped

the attention of the theorizers. Nevertheless they have their lesson to teach. They tell a story which demands the attention of every artillerist, and their teaching cannot be misunderstood.

Taking up the events in their historical order, we shall attempt to present the conditions of each problem, divested of all surplusage, and its solution as actually carried out, and then point out some of the lessons which we think it teaches. We shall attempt to do this without theorizing. We do not pretend to have made any new discoveries, and disclaim any intention of writing a new chapter in the Art of War.

Port Royal is the finest harbor on the southern coast, south of Hampton Roads, and could easily afford shelter to the largest navy in the world. To be sure there is no large city on its shores, but possession of the harbor was essential to our blockading operations, and the Government decided to have it at all hazards. On the other hand the Confederacy was determined that we should not have it. Although it was useless to them except as an *entrepôt* for blockade runners, the fact that it was invaluable to us as a base for our blockading fleet, demanded that every effort should be made to hold it. That there was no large city there to guard, simplified the problem for the engineer. The entrance to the harbor only had be considered.

The correct solution of this problem in defense was too important to the Confederacy to be entrusted to any amateur in the art. The supervising engineer who actually constructed the works, says in his report: "The general location of these defenses, together with the number and character of guns to be employed, was designated by General Beauregard." So in the defenses of Port Royal harbor we have the embodiment of what theory had devised, as late as 1861, as an adequate defense against an enemy whose naval power was well known to the distinguished engineer who planned them.

The problem as already said was uncomplicated by the presence of any private interests. The channel to be closed was 4620 yards wide. Good sites for defensive works could be found on both sides of the entrance, although without natural command. The power and calibre of the guns and the character of the ships likely to be brought against the works were known, and no ship could pass the defending batteries at a greater distance than 2310 yards, at which range she would be subjected to the fire of both works. If the ship should sheer off to avoid the fire

of one fort she would only find herself deeper in the deadly zone of the other.

It is needless to enter into a description of the works from an engineering point of view. It is sufficient to say that they were planned by General Beauregard and constructed by a competent engineer. It is amusing, however, to note how tradition and theory operated upon the engineering mind in the construction. The work on Hilton Head island—Fort Walker—was important, in that it helped to close the entrance to the harbor. Its water battery was its principal feature, still, to protect it from sudden assault in rear by a landing party, it was closed on the land side by a strong parapet, and surrounded by a wide and deep wet ditch. As planned by General Beauregard it was simply a water battery protected from any sudden dash that might be attempted by a landing party. But the supervising engineer had the influence of the text-books still strong upon him, and he takes much pride in reporting that "The ditches on the water front, not being protected by bastions, I arranged caponnierès, constructed of palmetto logs, pierced for two tiers of musketry, and approached by galleries leading under the parapets from the interior of the fort." Cautious young man. He no doubt thought he had found a flaw in General Beauregard's work. The caponnière was in the text-books, and had been ever since the invention of gunpowder, if not before, and should not be omitted whether the functions of the fort demanded its presence or not.

But let us assume that the engineering work was done, practically on the lines prescribed by General Beauregard. We can forgive the frills, let us look at the armament. What was considered an adequate armament in 1861 to close the entrance to Port Royal against any naval force that the United States could bring against it? The supervising engineer says in his report upon Fort Walker: "The armament of the water front as ordered by General Beauregard consisted of seven 10″ Columbiads." Manifestly the armament of the land front was left to the discretion of the supervising engineer. The armament of the water battery alone was prescribed. We know that the work mounted twenty guns, so on the flanks and bastioned land front of the work, thirteen guns must have been mounted. The Comte de Paris says on this subject, the subject of armament: "It consisted of twenty guns for Fort Walker and nineteen for Fort Beauregard, but only eight of the former and seven of the latter had the range of the

fleet." Fort Beauregard had three guns mounted in a detached battery for the purpose of firing red-hot shot. The artillery commander of Fort Beauregard says in his report: "Our fire was directed almost exclusively at the larger vessels. They were seen to be struck repeatedly, but the great distance—never less than 2500 yards—prevented our ascertaining the extent of the injury." So the fleet must have kept nearer Fort Walker than Fort Beauregard, which is probably true.

Both works seemed to have been adequately manned.

In addition to these works there was another feature in the defense which must not be overlooked. The Comte de Paris says: "A flotilla of eight small steamers had been organized by Commodore Tatnall." And he adds, "The Confederates placed great reliance on that flotilla and its commander."

We do not propose to argue that the defense as organized was adequate or inadequate. We merely point to the fact that it was the creation of General Beauregard and Commodore Tatnall, than whom no officers stood higher in their respective professions. That between them they knew perfectly what force might be sent against them, and that, so far as General Beauregard was concerned, he was satisfied with the defense. We would also call attention to the fact that no obstructions were attempted, although suitable material was abundant. A few stone-laden schooners, sunk in appropriate positions and guarded by Tatnall's fleet, or piling at difficult points in the channel, or submarine mines, none of which were unknown to the eminent men who organized and planned the defense, might have been resorted to, if any doubt had existed in their minds as to the adequacy of the artillery defense. But no auxiliary defenses were resorted to, and we are compelled to believe that the defense as planned was considered adequate by its authors. That this is not an unwarranted assumption is clearly established by some other incidents which occurred about that time. A battery of four heavy guns was built at Cock-pit Point, no doubt by order of the same General Beauregard, who complacently assumed that the Potomac River would thereby be closed to commerce. And strange to say we of the North accepted the assumption, in spite of the fact that several wood schooners ran the gauntlet of the battery without injury. But actions speak louder than words, and there is no denying the fact that the presence of that battery was generally assumed to be an effective blockade of the river. We are justified

in our statement then, that even educated soldiers overestimated the effect of artillery fire in the early years of our War.

We shall now see how this defense, assumed to be adequate by distinguished military and naval commanders, stood the test of war. The defenses were completed, the armament mounted and the men drilled before any enemy put in an appearance. There was nothing in the nature of a surprise in the attack, and none of the Confederate commanders complain in their reports of want of readiness on their part. The United States' fleet arrived by installments, it having been scattered by a storm, and anchored inside the bar within sight of the defenses as if for inspection. The Confederate commander says in his report that it consisted of "Fifteen war steamers and gunboats."

After several days' delay, this fleet advanced to the attack, headed by the flag-ship. It moved slowly, according to Confederate reports, in an elliptical course, delivering its fire at the two works alternately, not broadside about, but devoting itself to the nearest work during the whole time of its passage. The fleet passed and repassed the forts three times in this way, which, counting from the start occupied about five hours, and at 2 P. M. Fort Walker was abandoned by its garrison. When this was observed at Fort Beauregard the garrison of that work also withdrew.

That the garrisons fought well, and did not abandon the works prematurely is established by the fact, which we find in the report of the commander of Fort Walker, that only three guns in the water battery of that work remained serviceable when the garrison withdrew.

There is much food for thought in that short story. A stream of wooden war-ships had been drifting past these batteries, within easy range, for five solid hours, and while the batteries became untenable and were abandoned, not a single ship was disabled or seriously injured.

The full meaning of this remarkable event seems to have been better understood on the side of the vanquished than on that of the victors. Shortly afterwards, in connection with a subsequent event, General Beauregard, while testifying before a Court of Inquiry, said: "The true plan for the defense of a river from the passage of steamers, etc., is, when practicable, to obstruct its navigation with rafts, piles, torpedoes, etc., at the most favorable points for such obstruction; then to defend the

latter by a concentration of the greatest number of heaviest guns at one's command." It would be interesting to know when the necessity for such defenses first dawned upon the general's mind. Surely he had no such ideas upon the subject when he prescribed the seven 10-inch Columbiads for the water battery of Fort Walker; or the four heavy guns at Cock-pit Point. It certainly looks as if the battle of Port Royal had opened his eyes. Up to that time the teachings of the text books, and the traditions of the service were, that a gun ashore was equal to a frigate afloat. But steam was a new factor in the problem. It had been overlooked or underestimated. General Beauregard almost confesses that much in the answer above quoted. Did he have his own plan of defense at Port Royal in his mind as the false plan, when he spoke of "the true plan," in his evidence? Then in that same answer he uses the words: "from the passage of steamers." He does not say war steamers, but steamers. He had learnt something from that battle of Port Royal, which it took our leading men some time to find out. We shall see later on when General Grant found it out. Of course naval officers knew it: but as a rule army officers did not.

We now turn to our second example, namely, the passage of Forts Jackson and St. Philip, and find some new features in the defenses. The two works had been constructed in times of profound peace, by able engineers, and were no doubt believed capable of fulfilling the functions for which they were created. There are no ear-marks about them to indicate that their authors contemplated auxiliary defenses, or had any doubt of the adequacy of the artillery defense. When they are introduced to our notice however, just before the event now under discussion, we find that the artillery defenses have been supplemented by many formidable contrivances, which look exceedingly like fruit from the seed that was sown at Port Royal. We find that a raft had been constructed, and anchored in the river, completely obstructing the channel between the two forts. This raft was directly under the guns of the forts, and as long as it could be maintained, effectually blocked the passage of the river. Numerous fire-rafts had also been prepared and held in readiness to turn loose at any time with the double purpose of lighting up the river at night, and carrying consternation if not destruction among the enemy's ships. There was also a co-operating flotilla of iron-clad rams, armed steamers and gunboats, some of them quite formidable.

The armament of the forts, while not exactly what the officers in command would have liked, was much more formidable than that for which the works were constructed, and compared favorably in power and calibre with anything on board the hostile fleet. We read in the report of General Duncan, who commanded the defenses on the lower Mississippi, that the armament of Fort Jackson had been increased, a short time before the attack, by the addition of three 10″ Columbiads, three 8″ Columbiads, one rifled 42-pdr., five 10″ sea-coast mortars, and two 7″ Brooke rifled guns, one of which, however, was withdrawn from the fort, and placed on board one of the iron-clads before the battle began. These with the guns already in position must have completely armed that work. Indeed, not another gun could be mounted. We have not looked up the armament of Fort St. Philip, but as it is not to be supposed that the Confederate commanders put all their eggs in one basket, we are justified in assuming that it also was adequately armed.

The armament of the Confederate flotilla is not given in any of the Confederate reports which have come to our notice; but Commander Mahan, U. S. N., gives it at 30 guns, of which 16 were mounted on the iron-clad *Louisiana*. It is proper to state that this formidable iron-clad was not wholly finished, so far as her engines were concerned, but had been sent down in the expectation that she might be moored in some convenient position and do effective service as a floating battery, impervious to any shot the enemy could throw against it.

Forts Jackson and St. Philip are not more than 800 yards apart, and as already said, were believed to effectually close the river against a hostile fleet. General Beauregard, who had been in charge of the defenses of New Orleans, before he was called to Charleston to conduct the operations for the reduction of Fort Sumter, had added nothing to either work, although in his testimony before the Court of Inquiry which investigated the fall of New Orleans, he says that "Forts Jackson and St. Philip could not have prevented a certain number of steamers out of a fleet, from passing up the river in a dark night, or a foggy day." As already said, we believe the general got that idea at Port Royal. He goes on in his testimony to say that he believes in a boom for such purposes, and that he prepared the plans for such a defense immediately after Louisiana seceded, and placed it in the hands of a member of the State Military Board, where it was probably

pigeon-holed. At any rate it never materialized, and the general's reference to it in his testimony sounds so much like "I told you so," after the disaster, that we cannot believe that he deemed its presence an absolute necessity at the time.

That the general was not at all easy in his mind on this subject of obstructions, is manifest from his anxiety to convince the Court of Inquiry that the U. S. Engineers who planned and constructed the works intended that the artillery defense should be supplemented by a boom in the river. That we may not be chargeable with misrepresenting the general on this point we quote from his testimony. He says "The true plan for the defense of a river from the passage of steamers, etc., is when practicable, to obstruct its navigation with rafts, piles, torpedoes, etc., at the most favorable points for such obstruction; then to defend the latter by a concentration of the greatest number of heaviest guns at one's command." And he adds "Such was the system proposed by Generals Barnard and Patton, Majors Chase, Delafield, etc., when they planned Forts Jackson and St. Philip." Such evidence must be accepted as conclusive so far as the officers mentioned are concerned; but we doubt if General Beauregard agreed with them until after Port Royal. Indeed he is careful not to include himself in his testimony, and as actions speak louder than words, we think we have already shown that he thought otherwise up to a certain date.

But if the boom or obstruction in the river was part of the original plan, it must have been the key-stone of the system, and its anchorage and position were questions of prime importance. Improvised anchorage for the sustaining cables in such soil as Forts Jackson and St. Philip are built on, was manifestly impossible, and the most important feature at both forts ought to have been mooring pillars and machinery. Yet strange to say no such works were in existence, and stranger still no place was reserved for their accommodation. That the boom was an afterthought, or an idea of which the authors were a little ashamed, is proved by the fact that the finished works showed no place to put it, and no machinery to anchor or operate it.

The absence of such mooring posts and machinery gave no end of trouble to the Confederate officers who constructed a substitute for the boom. But in spite of these difficulties, a raft was constructed in sections and moored between the forts, completely blocking the passage. On this point we have the evidence

of Colonel Lovell, an ex-officer of the U. S. Navy and aide to General Lovell, commanding the district of New Orleans. He says when testifying before the Court of Inquiry already referred to: "When the raft was in position, I considered it an effective obstruction to vessels coming up the river," and "I did not think it possible for the enemy to remove the raft, under the guns of Forts Jackson and St. Philip."

Now Colonel Lovell was a man of ability, and had had experience in this kind of engineering. His evidence must be weighed accordingly. But the raft, as originally constructed, was never subjected to the test of attack. It was partially broken up by the weight of drift-wood which accumulated against it, before the attack was delivered. This occurred, however, sufficiently long before the attack, to permit the reconstruction of the obstacle.

Portions of the original raft remained in position, or could be hauled back into it, and the gaps between those sections were filled up by schooners, anchored with bows up stream.

Colonel Higgins, also an ex-officer of the United States Navy had charge of this important work. He says on the subject, in his testimony: "I accordingly seized a number of heavily built vessels, and carried out my instructions. They were anchored across the river, as nearly as possible in the position occupied by the raft, and dismantled, their masts and rigging left to trail astern in order to catch the propellers of any vessels which might attempt to pass. Each vessel had two anchors down, and 60 fathoms of chain to each anchor, and then one-inch chains were stretched across all of them, connecting them with the raft sections remaining in position, forming a barrier which I am confident none of the enemy's ships could have forced under fire from the forts."

So, effectual obstructions were restored according to Colonel Higgins, although General Lovell, testifying after this barrier had been broken by the enemy says: "This obstruction was however, far inferior to the other, and was, by no means, satisfactory." At any rate it was there, and had to be removed before the enemy could pass up.

We searched in vain through the Confederate reports and evidence in the Rebellion Record, for any detailed statement of how this last barrier was broken. Colonel Duncan, who commanded the two works, says nothing about it, although he mentions the

fact that it was broken and scattered, in his report. He says that the enemy "Finding upon his approach * * * that the only resistance offered to his passage was the expected fire of the forts, —the broken and scattered raft being no obstacle—was suddenly inspired for the first time to run the gauntlet at all hazard." Well! if the colonel had reported more about how that raft became "broken and scattered," and less about what his adversary was "suddenly inspired" with, his report would have been more interesting, if not more instructive. We find the story told in detail however by Commander Mahan in the Scribner series. But Colonel Duncan avoids the subject in his report. He manifestly intended to say nothing on the painful subject. But his indignation at the actions of his naval coadjutors overcomes his discretion, and he says some things in that connection which throw considerable light on the breaking of the river obstructions.

Arrangements had been made for the naval authorities to send down fire-rafts at stated intervals. This important duty seems to have been neglected on the night of the passage and on several previous nights. The colonel says, with reference to the night of April 23d, the night on which the passage was effected: "In consequence of this criminal neglect the river remained in complete darkness throughout the entire night." There was opportunity then for an enterprising enemy. On April 18th we read: "None of the boats acted as guard-boat below the raft, so that in consequence the enemy sent up two launches to examine the character of the raft obstructing the river." Again we read in the same report under date of April 20th—no fire barges having been sent down—that "in consequence, between 11 and 12 P. M., under cover of the heaviest shelling during the bombardment thus far, one of the enemy's gunboats came up in the darkness and attempted to cut the chains of the raft." So, on the whole, we see how that raft became "broken and scattered" about as well as if the colonel had told us in detail.

At any rate the enemy seems to have been perfectly posted as to its condition, and at half-past three in the morning of the 24th thirteen of his ships steamed ahead, not tentatively, as Colonel Duncan supposed, but inspired from the first with the intention of going straight up the river. They passed the forts in column of twos *en échelon*, Colonel Duncan says—so it could hardly have been pitch dark—and under cover of the darkness

and their own smoke succeeded in doing so without suffering any material damage.

Reserving our comments on this incident, for the present, we turn to our third example of the effect of well-appointed heavy shore-batteries on hostile steamers passing within easy range, and find in it some facts calculated to dispel the remaining mists of artillery tradition. Vicksburg was the Gibraltar of the Mississippi. Its natural features and position on the river were so admirably adapted for the emplacements of batteries for the blockade of the river that the engineer had but little to do on the water-front. Its water batteries were planned, constructed and armed by some officer who still believed in the traditional power of artillery, were completed long before it was attacked, and had closed the Mississippi for months against the forces of the Union. General Grant and Admiral Porter had been wrestling for months with insurmountable collateral difficulties in the hope of finding some way to circumvent the unassailable and impassable batteries of Vicksburg. There is nothing more admirable in this admirably conducted campaign than the indomitable pluck which inspired and sustained the leader of the Union forces, who refused to accept defeat or acknowledge failure in this great undertaking.

Vicksburg had no importance in Northern eyes, except that it closed the Mississippi. To that end it had been fortified and armed, and the resources of the Confederacy had been strained to the utmost to make it impregnable and effective. It was the only link which bound the Confederacy to its trans-Mississippi territory and armies, so that apart from the blockade of the river the Confederacy had vital interests in Vicksburg. These facts make it unnecessary for us to inquire into the armament of its water batteries. We may rest assured that it was as numerous and powerful as the resources of the Confederacy would permit. And it should not be forgotten that the resources of the South in the matter of heavy guns were superior to those of the North. Not only had they got possession of the larger half of the cannon already manufactured, but also the famous U. S. cannon foundry at the Tredegar Iron Works, with all the models and machinery for that kind of work owned by the United States at the outbreak of the Rebellion.

General Grant must have been at his wits' end with the problem of Vicksburg. He had tried almost everything and every-

thing had failed. At last the question seems to have arisen in his mind, *Does the infernal place close the river anyhow?* He no doubt broached this question to his naval coadjutor and was satisfied with his answer. To think was to act with General Grant. On the 12th of April he writes: "In about three nights from this time Admiral Porter will run the Vicksburg batteries." "I will send four steamers, the machinery protected from shot by hay-bales and sand bags." Think of it ye iron-clad advocates. Hay-bales and sand-bags, as protection against the best and heaviest artillery of the day, at pistol shot ranges.

"On April 17," Grant writes, "Seven gunboats and three transports ran the Vicksburg batteries last night." "One man killed and three wounded." The problem was solved, but General Grant blows no trumpet. His report might be laid alongside Cæsar's famous *Veni, vidi, vici.* It is equally to the point and much more modest. General Grant was no doubt somewhat chagrined that he had been so long blind to so simple a solution. He thought over it for two days and then writes under date of the 19th. "Our experiment of running the batteries at Vicksburg, I think, has demonstrated the entire practicability of doing so with but little risk." The great artillery bugaboo was found to be a man of straw. Still there are men in military uniform today, who pretend to be afraid of it. A few guns—some of them built to throw stone balls—mounted on the banks of the Bosphorus and Hellespont are gravely assumed to coop up the Russian iron-clads in the Black Sea, and statesmen wag their wise heads about them, and diplomatic notes are written about them, and war will be declared some day on their account. But we reserve comment on the artillery bugaboo until our examples have been stated.

Our next example introduces a more difficult situation than we have yet encountered. The entrance to Mobile Bay is about three miles wide. It was defended by two regular works, one at each side of the entrance. It must not be assumed that the whole three miles were navigable to vessels of ordinary draft. The ship channel was only 2000 yards wide, and was situated close to the stronger of the two defending works, known as Fort Morgan. The shallow water between the ship channel and Fort Gaines—the other defensive work—was navigable to vessels of light draft only.

The armament of Fort Morgan, with which the attacking fleet

would have to do, consisted of seven 10″ and four 8″ Columbiads, twenty-two 32-pounders, four 5.8″ rifles and four 6.5″ rifles, all of which bore directly on the ship channel, except one 6.5″ rifle and sixteen 32-pdr. guns.

The armament of Fort Gaines need not be considered.

The auxiliary defenses consisted of a double row of piling, extending from Fort Gaines, across the shallow water space, to the edge of the ship channel immediately opposite Fort Morgan, prolonged by a triple line of submarine mines to a point within 226 yards of that work. The submarine mines were what are known as contact torpedoes, they numbered 180 in all, and were planted in the most approved quincunx order.

The existence of this torpedo defense, although strongly suspected, was not known to the fleet when it first arrived off the entrance. Its position and extent, and also the fact that there was a gap in it, immediately under the guns of Fort Morgan, were discoveries made by reconnoitring officers from the fleet, sent in under cover of darkness while the fleet lay off the bar.

The naval defense consisted of the ram *Tennessee*, the most powerful iron-clad built by the Confederacy, carrying six heavy rifled guns of 7″ and 6″ calibre, and three gunboats also carrying six guns each of the same character and calibre.

The fleet which broke through these formidable defenses consisted of four monitors and fourteen wooden ships.

The preparations for the attack were somewhat unique, and cannot be passed over without notice. The *Richmond* barricaded her starboard side with sand-bags; spars and unnecessary boats were landed; port guns, as far as possible, were shifted to starboard side, and topmasts were generally sent down. The *Hartford* and *Brooklyn* alone went into action with topsail yards crossed. The wooden ships were lashed together in pairs. The advance was in two columns, monitors on the right, wooden ships on the left. The battle with Fort Morgan began at 7.05 A. M., and at that hour the rebel fleet drew up across the channel behind the torpedo defenses, and raked the Union columns with their fire. At 7.30 A. M. the leading ship—the *Brooklyn*—was abreast of Fort Morgan. The monitor *Tecumseh*, seeing the iron-clad *Tennessee* coming into action behind the torpedo line, forgot, or misinterpreted, or disregarded the Admiral's instructions and went straight for her, across the well-known torpedo line, and, as

a matter of course, was blown up, before she had an opportunity of delivering her fire at the *Tennessee*.

Another unpardonable blunder occurred. The *Brooklyn*, the leading ship, got a torpedo scare, and in her attempt to back, her bow fell off towards the fort, until she lay directly athwart the channel, effectually closing it to the rest of the fleet, and subjecting herself to a raking fire from Fort Morgan, to which she could reply with her bow gun only. There was serious danger of collisions, among the following ships, as they found their advance thus blocked by the *Brooklyn*. Before their headway could be stopped they were jammed together almost in a solid mass directly under the guns of the fort. The situation was serious, but there was no panic. The ships continued their fire as if nothing unexpected had happened. Fortunately, in her continued efforts to back, the bow of the *Brooklyn* fell off to port, and her broadside batteries opened again on Fort Morgan. She then resumed her advance, followed by the fleet. But what a terrible twenty minutes she had inflicted on them. There they were, huddled together directly under the guns of the fort, subjected to a fire in flank from Fort Morgan and a raking fire from the rebel fleet. Their only salvation was their invisibility. The smoke completely covered them. The topsail yards of the *Hartford* and *Brooklyn* were the only visible things above the Union fleet during that part of the battle. The wooden ships passed the fort slowly maintaining their fire, and as soon as they were past each cast loose her consort and prepared for action against the rebel fleet. The monitors remained abreast of Fort Morgan, and continued their fire until the wooden ships were all past and then followed to attack the *Tennessee*.

The battle opened at 7.05 A. M.

The *Brooklyn* began to back at 7.30 A. M.

The *Brooklyn* got straightened out again at 7.50 A. M. And at 8.05 A. M. the *Hartford* came to anchor inside the bay. At 10 A. M. the *Tennessee* surrendered and the other rebel vessels escaped. The battle was over. Losses: one monitor blown up with all on board, only 21 being saved, and in the rest of the fleet 52 killed and 170 wounded.

We have now traversed our proposed course and the examples are before you. They are no theoretical assumptions, but actual occurrences, spread on the record without any effort at adornment. They are a collection of cold facts, the teaching power of

which excels all the theorizing which literary warriors have devised since the defeat of the Spanish Armada. One may feel disposed to argue that if Fort Morgan had been armed with modern guns—say hundred ton guns—Farragut's fleet would have been annihilated. But the facts are all against such an argument. What would have been the effect on the ships, if every shot had weighed a ton, and moved with a velocity of 2000 feet? Why, the shot would have cut larger and cleaner holes, that is all. There would have been fewer splinters flying about. It would have been to the advantage of the fleet.

But some one may argue that Fort Morgan had no range finders, or any of the modern refinements in the way of instruments—telescopic sights and the like—to enable the gunners to do good work. But what would have been the use of range finders, say at Fort Jackson or at Vicksburg, or even Mobile Bay? Of what advantage would a Fiske range finder have been to the garrison of Fort Morgan, where the hostile fleet was jammed in the channel under their guns at 100 yards range? What help would the anemometer have been to them, or any of the paraphernalia which we are trying to make ourselves believe are absolutely essential to gunnery? Just think of setting a vernier under such circumstances, or resorting to any other of the fancy fads of the theorizers. Why, five minutes' work like that which fell to the lot of the gunners in Fort Morgan, or on board Farragut's fleet, would cure all such cranks of their theories for the rest of their lives. War is not a problem in mathematics even in our arm of the service. Ballistics are beautiful and useful in time of peace, but in battle they are balderdash. Give us as good guns as our adversary—better if possible—and as good cover; well-trained and well-disciplined men, brave and nervy officers who can keep their wits about them in situations like that at Fort Morgan, and we need no frills. It is a positive crime to teach young men that battles are fought by the square and compass. It is a positive crime to fit up guns with fancy gimcracks, unsuited to the rough usage of excited and half crazy men. No fragment of hostile shell, or blow from a friendly handspike should be capable of disabling a gun. It should work as smoothly as possible, but it should be strong in all its parts. Then the men should be trained until they become automatons, so accustomed to do right that they would find it very awkward to do wrong. But do not teach them that battles are fought with mathematical

instruments, or that telescopic sights, anemometers and verniers, are necessary to lay a gun in action, because it is not true. Gunners thus trained are apt to become demoralized when first introduced to the terrible reality of battle.

We set down, therefore, as the first, and perhaps the greatest artillery difficulty of the next maritime war, as false equipment of the batteries, false teaching of the officers and false training of the men. War is a rough business and it is conducted in a rough way, by rough and often awkward men. Delicate instruments and flimsy fittings are out of place in it. There should be no chance for the gunner to disable his own gun, and as little chance as possible for the enemy to do it. If possible there should be nothing about it that will break. Strength and simplicity are prime requisites in all warlike machines, and simplicity solo is the acme of excellence in drill regulations. When the cannoneer can serve his gun efficiently with his eyes tied up he is trained. The cannoneers in the casemates of Fort Morgan would have seen little less than they did, if their eyes had been tied up. Then the gunner should be able to lay his gun without looking at the enemy. The captain and not the gunners should control the fire of the battery, and the training which teaches otherwise is vicious. A captain who abandons control of the fire of his guns in action has taken a long step towards rendering his battery inefficient. Maritime enemies who mean business will in the future, as in the past, force the fighting at close quarters, and long range shots which so captivate the imagination of inexperienced artillerists, will be rare and indecisive. Indeed it is so easy for a war ship, or even a fleet, to find concealment now-a-days, that long range targets will be hard to find.

The second artillery difficulty in the next maritime war, will be smoke. We concede the practicability of smokeless powder, and even its general adoption in the armies and navies of the world. But that will not eliminate smoke from the battle-field. The invention of smokeless powder has just opened the eyes of military men to the importance of smoke. Of course the utilization of smoke in battle is no new thing. Smoke was the keystone of Napoleon's tactics. But as battle experience became dimmed by the glare of theoretical deductions, the smoke of battle was forgotten, and the modern Bobadil with his preposterous assumptions of steady nerves and clear atmospheres in battle came to the

front with his theories, and rewrote for us the elements of our art thus converting us into a bugaboo.

But smoke on the battle-field is not an unmixed evil, and able tacticians and old soldiers regret its prospective elimination. They prefer to have it, therefore they will have it. Smoke will never disappear from battle until it ceases to be useful there. So we read in the newspapers that there was an advance of the English Channel fleet into the Solent, under cover of smoke artificially produced for the purpose, as an instructive object lesson to the German Emperor. That exhibition, although unnoticed, except incidentally by the daily press, contains the keynote of the tactics of the future both by land and sea, and presents a problem of greater importance to gunners than range finders and telescopic sights. We should like to hear such a problem discussed from the standpoint of a sea-coast artilleryman.

The third and last artillery difficulty which we shall present for discussion on this occasion is *Individualism*. The evil is not specially confined to the artillery, but as there seems to be more plausible reasons for its existence there than in the infantry arm, it has not only been permitted to exist but has actually been fostered as a desirable professional accomplishment. Prince Hohenlohe, who says some very wild things about field artillery, formulates the following *ad captandum* statement which is dangerous, chiefly because it is true. He says the three important things for artillery are, first, to hit: second, to hit: and third, to hit.

The statement is just as dangerous as it is true and catching. Nine-tenths of the men who read it think that Hohenlohe means artillery marksmanship. Of course any one familiar with the German method of artillery-fire management knows that he means no such thing. Individualism has no place in the German artillery system. The hitting that Hohenlohe was thinking of was, the hitting by batteries, as distinct machines under the control of their captains. The gunners lay as ordered, they never aim. Unfortunately all artillery officers either do not know, or do not believe in the German methods, and Hohenlohe is misinterpreted accordingly. Thus individualism—visual aiming—squirrel shooting markmanship has got such a hold of many artillery minds, that it is bound to come to the front as a serious artillery difficulty in the next maritime war.

At Port Royal, at Fort Morgan, and our other examples, we

have every reason to believe that the guns were aimed individually, because that is the American way, and there is nothing said in any of the reports about any new method. Each gunner aimed his gun as the sportsman does his rifle, picking out the target that suited his fancy. The result was a distribution instead of a concentration of fire. If the fire had been properly controlled and concentrated, it is impossible that wooden ships could have passed such batteries, practically uninjured.

To make sea-coast batteries effective, captains must command. It will not do to delegate the direction of the fire to the gunners however capable they may be. The fire of batteries must be concentrated upon the same object, and if deemed necessary the fire of groups of batteries must be so concentrated. We must get rid of individualism, and fight our batteries, or groups of batteries, as single machines, controlled by one man only.

Individualism has ruined the reputation of sea-coast artillery. Up to the passage of the Vicksburg batteries, General Grant had a profound respect for it. He had no idea, until desperation suggested it, that the batteries could be successfully run. But he learned that it could be done "without much risk." Admiral Porter believed it. Admiral Farragut proved it. The examples we have cited teach it, and we all ought to know it.

What then is the cause of it? We answer unhesitatingly, *Individualism:* The effort to aim guns instead of batteries. The abdication of artillery captains in favor of their gunners. Distribution of fire instead of concentration. We must learn to fight as batteries and groups of batteries if we would be effective. At Fort Morgan the destruction of the *Brooklyn* meant the defeat of Farragut. She lay across the channel like a gate. Her topsail yards were visible, and told the story of her position. If the commander of Fort Morgan could have concentrated his fire on the *Brooklyn*, and fired low, she could not have escaped. He should have been able to do this: but the traditions of the service had never taught him the necessity. We can plead no such excuse. Yet we are never trained to act in concert. There is nothing in any of our manuals of instruction about it. The teaching and training of the Artillery School ignore it. Our general practice is against it, and the consequence is that our batteries might be run even by wooden ships "without much risk."

THE RECENT INDIAN CRAZE.*

By CAPT. W. E. DOUGHERTY, U. S. A.,

First Infantry.

THE recent turbulence among the Sioux is one of the most extraordinary that has occurred within my recollection. It was the result of many causes, some remote and some recent, some grave and others frivolous and fanciful, rather than real, the aggregation making a just and plausible cause of discontent that perhaps would not have been endured so long and so patiently by any other people than Indians, without resentment. Before we came here even, it was apparent enough to any one who had ever lived with these Indians that from the first there was no intention whatever to go into open and defiant revolt, and that they had no expectation that force would be brought against them. The Messiah craze and Ghost dance, at first, was only a diversion, and developed into what Britons, and Americans suffering from Anglomania, would call a "fad." It had no significance whatever until the priests and designing leaders adopted it as a means to foment an agitation on which they could flaunt into prominence and distinction, just as our priests and politicians work our people. This is the reason we have a new crop of leading Indians, men who were unknown when I left Dakota eight years ago.

General Miles tells me that the Messiah craze is the outcome of a great conspiracy among several tribes of Indians, extending as far west as Nevada, and that the Mormons are at the bottom of the whole thing, and he says that he has evidence to establish all this. However this may be I know that the Messiah legend and the Messiah dance among the Indians are twenty-one years old, though I do not think they came among the Sioux until recently.

* * * * The day the order was given for the troops to march from Fort Niobrara to Rosebud Agency, Two Strike was on his way down to see General Kautz and have one of the periodical talks that are necessary to the happiness and contentment of

*Extract from letter received at M. S. I. in Feb., 1891.

Indians who live near a post. As soon as he found that the troops were ordered out, he returned to Rosebud as fast as he could go, and left the Agency with eighteen hundred people.

The same thing happened here. The agent went to the railroad and asked for troops to come to the Agency, because some Indians who were having a Ghost dance a few miles from the Agency refused to stop it when he sent them word to do so. When the troops came, all those who felt any fear of a collision left the place and went to the camp in the Bad Lands. The settlers and the newspapers then got in their work, until the alarm became general, and the Indians were obliged to assume a hostile attitude in self-defense, and as justification of this attitude the accumulated grievances of the last fifteen years were put forth, the principal among which was the recent diminution of the regular supply of food. The unfortunate occurrence at Wounded Knee Creek changed the whole aspect of affairs, and brought the Indians who were out and who left the Agencies then, to the point of desperation.

* * * * * * * *

It was a spectacle worth beholding to see them come in and go into camp at the place designated for them. They moved in two columns up White Clay Creek, one on each side, about 5500 people in all, with 7000 horses, 500 wagons, and about 250 travois, and in such good order that there was not at any point a minute's detention on any account.

The rear and right flank of this mass was covered during the movement by a force of infantry and cavalry deployed in skirmish order, and moved with a precision that was a surprise to all who witnessed it. The thing was a revelation to me, and an unmistakable proof that during the last ten years these people have developed a power and a capacity to make war in their own way that must compel a modification of the means heretofore adopted in Indian warfare.

Had the majority of the Indians in the hostile camp been in favor of war, there would be a different tale to be told now. At any time from the first to the tenth of January they could have taken the Agency and everything in and about it, and could have done it off-hand. Of course their loss would have been great, but ours would have been total.

Considered all round the result was most gratifying and fortunate, and it ought to be a lesson for the future.

Some affect to believe that the Indians have been humiliated and overcome by our show of power, and that quietude is assured for the future until Secretary Noble converts them all into grangers.

There may be peace for a time, and probably will be, but permanent quietude and contentment are not apparent to me.

THE NEW GERMAN RIFLE AND FIRE REGULATIONS.

By LIEUTENANT A. S. FROST, U. S. A.,

Twenty-fifth Infantry.

THE present arms, ammunition and rifle training of the German infantry, in accordance with the Regulations of 1890,* are given in a handbook describing the rifle, bayonet and revolver, their care, etc., and containing the regulations for instruction in the use of the revolver and rifle.

The new German rifle, model 1888, is very fully described, and is compared with the old model, 1871–84. This feature of the work adds to its value, as it thereby becomes a short history of the progress in infantry arms for the last twenty years. This was not designed to lend historic interest to the book, however, for, as the introduction of a new rifle into an army as large as Germany's is a work of time, we find both the old and the new models in the hands of the troops, and the shooting regulations consequently treat of both.

About a page is devoted to a description of the bayonet, with cuts representing and naming the various parts. The rest of the book is devoted to the rifle and revolver and their use.

We have culled a few descriptions of the new gun which may be of interest to the reader.

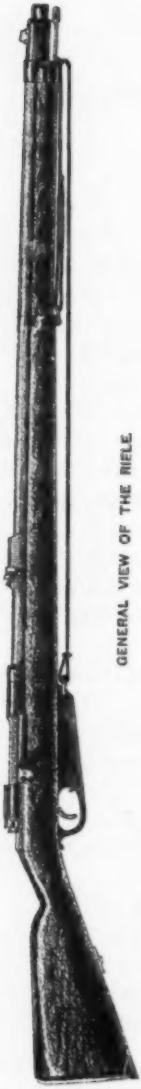
The calibre of model 1888 is 7.9 mm. (0.311 in.). This small calibre makes the use of a nitrate-powder necessary, and from this there results:

Greater initial velocity (620 metres or 2034 feet).

Flatter trajectory, the greatest height above the line of sight when using the 500 metre sight being 1.50 metres.

Greater accuracy. For example, at 600 meters the width of the shot group is 64 cm., the height 140 cm. The guns will

* "The present Arms, Ammunition and Rifle Training of the German Infantry, in accordance with the Regulations of 1890." E. S. Mittler and Son, Berlin, 1890. This is not an official publication, but is one of a large class of private publications supplementary to those issued by authority.



GENERAL VIEW OF THE RIFLE.

CROSS SECTION SHOWING THE LOADER IN POSITION AND THE MOVABLE BREECH OPEN.

THE GERMAN RIFLE—MODEL 1888.

therefore, at the distance of 100 metres be used on a rectangle 40-cm. high and 10 cm. wide.

Greater penetration. Brick walls, at the shorter distances, are unsafe cover. If several shots strike in the same spot they will make a clean hole in a 7 mm. (0.276 in.) iron plate up to 300 metres. At 800 metres a 25 cm. (about 10 in.) pine log will be penetrated. Earth will only afford cover when 75 cm. (29½ in.) thick.

Greater range.—3800 metres or 4180 yards. Elevation 32°.

The twist to the rifling is increased. It now makes one turn about the axis of the bore in 24 cm. (about 9½ in.) of length, which causes the bullet to make 2580 revolutions per second. (This was 790 in the old rifle.)

The barrel is covered with a jacket or mantle with the following results:

The position of the barrel is independent of the stock. Bends or other irregularities in the stock are without effect upon the barrel. Nevertheless the barrel can move freely and regularly, expand when heated, and, further, is protected against injuries, such as falls and blows.

The heat of the barrel is only communicated to the jacket little by little, so that heat waves in aiming and the disadvantage in aiming of handling a hot barrel seldom occur and then only in rapid firing.

The sighting apparatus, the projection for the upper band, the thread for the connecting screw, the seat for the bayonet band, and the bands, are all upon the jacket. Thus all the prejudicial influences exerted by these parts are removed from the barrel,—for instance, soldering the rear-sight bed, roughly wrenching the bayonet in its removal, jamming of the bands.

The sight.—The notch of the rear sight is widened to 2 mm. so that aim can be quickly taken. The fixed sight is for use up to 250 metres,—the small leaf up to 350 metres,—the large leaf, at the lowest position of the slide, for 450 metres. The highest sight (the notch at the top of the frame) is for 2050 metres. The sight is the same as before, except that the numbers on the large leaf are larger and are on both sides, and the marks are more distinct.

The lock.—The old magazine apparatus has been abolished, and the case substituted. In this five cartridges are entered simultaneously by means of a steel frame which holds them. They

are inserted in the bore one after another, at each opening and closing of the chamber, by the action of the feeder and the lock-head. This ensures a greater readiness and makes possible a greater rapidity of fire. The lock and its envelopes are substantially unchanged. The spare parts, with the exception of the firing pin and firing pin spring, are lighter.

The stock.—This has greater resisting power owing to the removal of the magazine tube. The butt is cut off obliquely so that the fully equipped soldier can readily place it in his shoulder.

The gun is 1.25 metres long, and weighs 3.8 kg.

The ammunition.—The bullet consists of a hard lead filling pressed into an outer case of nickeled steel. Without this coating the lead bullet would not take the rifling, would become misshapen by the great velocity, and its penetration would be lessened. The bullet is not made entirely out of the hard metal, because its specific gravity is too low to make it available for the purpose.

The bullet weighs only 14½ grammes, and is, in round numbers, 32 mm. or 4 calibres, long. The weight per sectional area is very favorable, being 0.29 grammes per square millimetre. The claws of the ejector take hold of a groove at the lower end of the shell.

The calibre of the cartridge is so much reduced that the field case which formerly held but 960 cartridges now holds 1125. The cartridge is 82.5 mm. long, or 4.5 mm. longer than the old model. The charge of powder is 2.75 grammes of "small leaf" gunpowder. The weight of powder to bullet is about as 1 to 6. The bullet is separated from the powder by a small piece of cardboard. The wax plug of the old model is no longer employed.

The soldier can carry 150 cartridges. In each forward pocket two, in the rear pocket, six packets. A packet holds 15 cartridges.

The gun, unloaded, weighs 3.8 kg.

With full war equipment of 150 cartridges (including weight of packets and frames) it weighs 5.03 kg.

A full box of cartridges (1125 rounds) weighs 41.95 kg.

A single cartridge (without lubricant) 0.0275 kg.

After describing the rifle, directions are given for its care, and the remainder of the book is devoted to instruction in shooting.

The penetration of a bullet fired from the new gun is as follows:

In dry pine.—At 110 yards, about 31½ in. At 440 yards, about 17.7 in. At 880 yards, about 9.8 in. At 1980 yards, about 2 in.

In iron.—At 55 yards a steel plate 0.3 in. thick receives little impression. At 330 yards an iron plate 0.275 in. thick is pierced.

In freshly thrown up sand.—At 110 yards, about 35½ in. At 440 yards, about 19½ in. At 880 yards, about 13.87 in. At 1980 yards, about 4 in.

To protect against infantry fire, breastworks should be at least 75 cm. (about 30 in.) thick.

Thin brick walls cover imperfectly; if several shots strike in the same spot they will penetrate.

With regard to the estimation of distances the following obtains:

Men will learn to estimate with certainty up to 600 metres and will be practised up to 1000 metres.

Officers and non-commissioned officers and well-instructed men should be able to estimate up to 1000 metres and be practised at longer distances.

Men mostly underestimate.

The shooting of the troops is divided into two general classes,—"School shooting," and "shooting according to the requirements of battle."*

The first might be called the recruit course. The second is subdivided into individual and collective training. We are told that shooting according to the needs of battle is the object of collective training, and it is therefore the most important part.

INDIVIDUAL BATTLE SHOOTING.

Within 250 metres against all objects.

Within 350 metres against a single kneeling man.

Within 500 metres against a kneeling file, both men close together.

Within 600 metres against a standing file, both men close together, and a single rider.

Especial care must be given to the behavior of the single man when opposed to cavalry, and he must gain the assurance that, when ready to fire, he is superior to the single rider even in open ground, and that he need not be chary of meeting several riders at once if he only remains cool and collected and does not

*Gefechtsmässige is the adjective employed. It is a pity we have no English equivalent.

lose sight of his enemy. Running skirmishers are helpless against cavalry, while by calmly firing they could meet the attack with confidence. Their strength is increased when the ground affords them cover and protection.

In collective shooting the bullets spread over a long space, and are more dense at the centre than at the ends. The beaten surface, when using the 600 metre sight, and under ordinary circumstances when the ground is parallel to the line of sight, begins about 50 metres in front, and ends about 50 metres in rear of the point for which the sight is fixed.

When two sights differing by 100 metres are used, the bullets spread over an area about 200 metres long. This space becomes lengthened when the ground falls with reference to the line of sight, and is shorter when the ground rises with reference to the line of sight.

An effect by indirect fire is only to be sought in rare cases when the known distance, the immovability of the objective, and the curve of the trajectory, promise useful results. As, for example, against troops in intrenchments:

USE OF SIGHT.

1. Up to 800 metres, one sight will be used.

2. Over 800 metres two sights, differing by 100 metres, will be used simultaneously. If observation shows the proper sight, one sight will be used.

3. Two sights will be given to the two ranks; the lowest to the front rank, the highest to the rear rank. It is not advantageous for two sights to be used by detachments under the strength of a zug.

"The practice of fixed fighting forms is forbidden, and it must be kept in mind that troops must be trained upon the drill ground according to the needs of war, so that nothing will have to be unlearned upon the battle-field."

"Fire in dispersed order will be the principal use of infantry."

This part of the book sets forth very briefly some of the leading principles contained in Mayne's fire tactics. We translate a few of the most interesting parts.

INFANTRY AGAINST THE DIFFERENT ARMS.

In the fight of infantry against infantry, the result, aside from the moral factors, depends upon the fire training, fire discipline, and fire leadership.

The problem of the leader is to bring as many rifles into action as possible, or to gain a preponderance of fire by combining the fire of extended lines against the decisive point. The execution of this principle becomes easier when we can obtain cover against the other parts of the enemy's line.

In every case, skirmishers engaged with the enemy's infantry, and finding themselves threatened by cavalry, must seek to avoid a closed formation. The infantry is in a position to advance over open ground without regard to cavalry, so long as this is not supported by infantry or artillery, or so superior of itself as to attack with several lines simultaneously on different sides.

Only under special circumstances will the forming of a square be justifiable. For example, when the troops have exhausted their ammunition or have been shattered by severe losses, or are forced to retire over open ground under a constant menace from superior cavalry.

In all situations infantry opposed to cavalry must remember that the latter has already achieved success when it has forced the infantry to make movements or take up formations prejudicial to the utmost development of fire.

In fighting artillery it must be observed that this arm has the superiority of fire at the longer and medium ranges. At about 1000 metres their fire is about equal, and at the nearer distances the infantry gains the superiority. The infantry must therefore seek, by proper use of cover, to approach as close as possible to the enemy's artillery. At first their fire should be directed against the animals rather than against the men. Cases are conceivable where infantry can fire upon artillery at great distances with useful results, but this requires an ample supply of ammunition. The infantry must never, however, seek to replace artillery at long range, or to rival its fire action. Such efforts lead, in the end, to a waste of ammunition.

USE OF THE INTRENCHING TOOL.

The present efficiency of fire-arms gives an increased importance to artificial cover. At the right time and place they lend the troops important and indispensable service. A condition for their use, however, is that they must serve the general plan instead of mastering it. The latter happens when they are begun before the plan has been fully determined upon. Premature strengthening of the ground is harmful and hinders free move-

ments. It requires on the part of the leader technical training in order to know *where* and *when*, not alone *how*, the intrenching tool is to be used.

The simplest kind of artificial cover is the shelter-trench, which is first constructed for lying men, and afterwards, if time permits, enlarged and strengthened for kneeling and standing men.

This work is executed according to the regulations for the training of infantry in field pioneer duty. In the defense the throwing up of intrenchments is to be united with the pacing and marking of distances in advance of the position. Even in the attack the intrenching tool can lend valuable aid in holding and strengthening captured features of the ground.

Owing to peace considerations the throwing up of intrenchments must be omitted on the drill ground as well as in the country, even when the necessities of the case would most require the use of the spade. In such cases, at least in the execution of prearranged plans, the throwing up of intrenchments is to be indicated.

EXERCISE BY FILE, GROUP, OR ZUG, WITH DUMMY AND BLANK CARTRIDGES.

A. By file.—The practice given to the single file should enable it, when combined with other files, as in the skirmish line, to act according to regulations and with confidence. Therefore, all the problems of the skirmish line should, as far as possible, be practised by the file in individual battle shooting.

B. By group.—Officers, or specially adapted non-commissioned officers, act as instructors; the younger non-commissioned officers act as group leaders. The men will be instructed in the conduct of defense and attack.

The defense.—On the order of the instructor the men of the group take up a position, clear the field of fire, make a rest for the rifle and lay their cartridges to hand. The group leader places himself in the position he would occupy in a real case. The position, as well as the manner of taking it up, is decided upon by the instructor, due regard being had to the principle that all considerations of cover must give way to those of fire action. Should the positions chosen by the men be unfavorable, they will be improved by direction of the group leader, subject to the officer.

XUM

At first, distances to 600 metres, and later, to 1000 metres, will be estimated.

The instructor causes a target to appear and gives, or lets the group leader give, the commands for opening fire. For example: —"Front, advancing skirmishers. Sight 600. Skirmish fire," or "Half right, lying skirmishers. Fixed sight. Rapid fire."

The behavior of the men must be carefully watched; whether they have quickly found the target, fixed the sights properly, handled the weapon according to regulations, and ceased firing quickly and correctly.

In the beginning, especially, there will be opportunities afforded for frequently interrupting the practice and commenting upon it; stating how the point of aim should be chosen, and whether the fire was correct and not over-hasty.

The supply of ammunition is also practised. Changing ammunition from front to rear pockets; taking ammunition from the wounded and the dead; bringing it up from the rear, and distributing it among the skirmish line as speedily as possible.

The attack.—This is furthered by cleverly advancing under cover of the ground, nimbly rising for the rush, and a dexterous arrangement within the position to be quickly occupied at the end of the rush. It is even more necessary than in the defense to make the individual skirmisher as independent as possible under all circumstances, for the result is endangered when fire leadership fails.

In order to habituate the men in taking care of themselves when fire leadership is lacking, it is useful to have the group leaders fall out occasionally.

The supply of ammunition is also practised in the attack as indicated above.

C. By züge.—While the training of the men is the first object of group practice, the training of the officers in their duties and responsibilities as zug-leaders has the first place in züge-practice. The older officers act as instructors, the younger officers or older non-commissioned officers as zug-leaders. This practice is executed similarly to that of the group.

What has been practised by the group in attack and defense will be repeated.

A natural use of this or that natural feature must always be arrived at. By this means leaders, subordinates, and men, best

learn to understand one another. In awakening the activity and resolution of the single man, leaders must always bear in mind that conduct in the different phases of the battle-field will not be bound by hard unchanging rules, but will be best furthered by the self-confidence and resolute spirit of officers and men.

The instruction in the use of intrenchments is laid down, also siege warfare. Under this last head is given a summary of the manner of attacking a fortress, and of the duties of the infantry of the defense.

It may interest the reader to know that rifle rests are a part of the military stores of the German army, and the troops are trained in their use for day and night firing.

In going over the book one is struck by the frequent recurrence of the expression "according to the needs of war," and is reminded that this book embodies the experience of a people who live under the eyes of a watchful enemy who seems ready to seize upon the first opportunity offering a prospect of success, and that under these hard conditions they have been forced to reject from their system all that is false and misleading. There is an effort to look facts squarely in the face, and this is what gives their military literature its value.

The widening of the notch of the rear sight seems to be a blow at individual shooting, for the Germans firmly believe that the fire of bodies of men, and not of individuals, will be decisive in war, and they expressly say that collective firing is the most important part of their training. Also that the notch of the rear sight is widened that the aim may be taken more speedily. The rear sight represents their belief that in the excitement of the short ranges it will be easier for the soldier to push down the large leaf and raise the small one, or to push down both, than to fumble with a complicated arrangement of slides and screws. At the longer ranges, where the soldier may be expected to possess some degree of coolness, an adjustable sight is provided.

Another remarkable feature of the book is the absence of any mere padding, the writer evidently not being ambitious of producing a portly volume. The whole book is no larger than the "Manual of Guard Duty," furnished the U. S. Army, and contains numerous cuts illustrating the bayonet, rifle, and revolver, the sheaf of trajectories, beaten zone, etc., etc.

THE RED RIVER DAM,

WITH COMMENTS ON THE RED RIVER CAMPAIGN.

By GENERAL JAS. GRANT WILSON.

DURING the summer of 1863 the movements of the French in Mexico rendered it desirable, in the judgment of President Lincoln and his Cabinet, that the United States should occupy some portion of Texas, then in the possession of the Confederates.

By direction of the Secretary of War, Gen. N. P. Banks, then in command of the Department of the Gulf, was ordered to restore the National flag to some locality in that State. "Do this by land, at Galveston, Indianola, or at any other point you may deem preferable," wrote General Halleck from Washington, August 20, 1863.

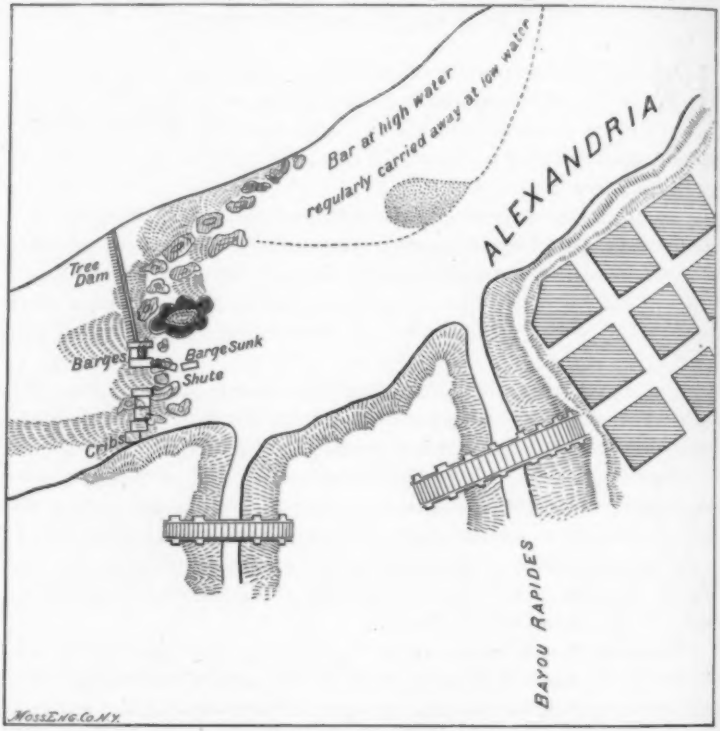
Early in September, an expedition under the command of Gen. Wm. B. Franklin was sent to take possession of the Sabine Pass, but the attempt was not attended with success.

Two months later the Commanding General of the Department, on whose staff I was then serving as aide-de-camp, personally conducted a second expedition against Texas. We landed at Brazos Santiago, crossed the battle-fields of Palo Alto and Resaca de la Palma, and restored the flag of the Union at Brownsville, on the Rio Grande River.

General Banks returned to New Orleans on the first day of December, and in obedience to orders from General Halleck began preparations for a campaign against Shreveport, La., the head of navigation on the Red River, 350 miles from the "Crescent City." Banks did not believe in the expedition, and opposed it, unless he could be largely reinforced by troops to take the place of those left to hold the Rio Grande. After much delay it was decided at Washington that Sherman should lend General Banks 10,000 men under the command of Brig.-Gen. A. J. Smith, with which, and his own force of 15,000, supported by a squadron of iron-clads commanded by Admiral Porter, he should move against Shreveport, and that General Steele should co-operate in the cam-

paign by advancing with a strong column from Little Rock, Arkansas.

The movement began in March, 1864, and early in April the army reached Natchitoches, 100 miles from Shreveport, and then commenced its march through the pine forests by a single road, the column being more than twenty miles long. On the 8th, the cavalry and several brigades of infantry forming the advance, was



THE RED RIVER DAM.*

attacked at Sabine Cross Roads, sustaining a severe defeat. The army fell back to Pleasant Hill, where, on the following day, the enemy made a second attack, and were as badly beaten and driven back as we had been in the first day's fighting. The analogy between these two days' work, and Grant's two days at

* Copied from an old map now in the possession of Capt. J. H. Willard, U. S. Eng. Corps, on which there are several notes in manuscript signed J. Bailey, Bvt. B.-Gen.

The dam is sketched in on the map in red ink and it is believed that this was done by General Bailey himself.

Shiloh is, I think, the most perfect that can be found in the annals of our four years' Civil War.

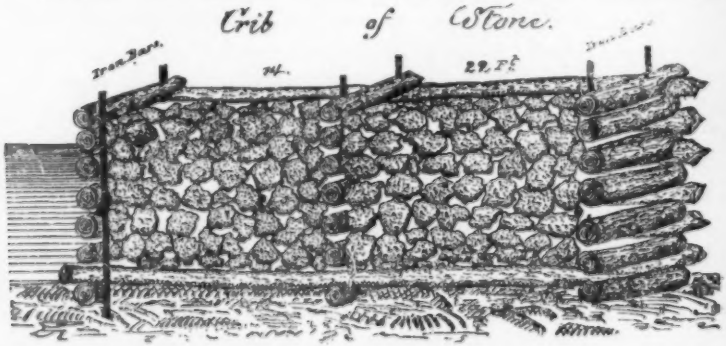
It was determined after this battle of April 9th to abandon the expedition and to fall back to Alexandria. The river had in the meantime fallen so low that it was found impossible for the heavy vessels of the fleet to pass the rapids and falls at that place. It was the general belief in both branches of the service that the ships of war, worth more than two millions of dollars, would require to be destroyed to prevent their capture by the Confederates. This difficulty had been anticipated by many army officers who were acquainted with the treacherous character of the Red River navigation, and the idea of rescuing the squadron by means of a dam suggested by a Western farmer.

Lieut.-Col. Joseph Bailey, of Wisconsin, acting engineer of the 19th Corps, who had had much experience on the rivers of the North-west, submitted to the Commanding General the plan of a tree dam. Banks entered fully into the project with perfect confidence in its practicability, and Gen. David Hunter, then at Alexandria on a mission from General Grant (who never approved of the expedition, as he told the writer shortly before he died), suggested that, although he had but little faith in its feasibility, he nevertheless thought the experiment had better be tried, inasmuch as General Franklin, an engineer officer, recommended it. The Admiral had not the slightest confidence in its success. As he expressed it in his own way to the present writer, "If *damming* would get the fleet over, it would have been afloat long ago."

The plan being finally approved of by the Commanding General on the morning of April 30th, the work was begun by Colonel Bailey, who was aided by several staff officers, and details of nearly three thousand men, consisting chiefly of regiments from the Western States. There were also employed in the construction of this great work some two hundred army wagons and about a thousand horses, mules and oxen. Several hundred hardy lumbermen, belonging to a regiment from Maine, were employed on the right, or north, bank in felling trees, while an equal number were engaged in hauling them to the river bank. Flat-boats were constructed, on which stone was brought from above, after being quarried, and the work was begun at the foot of the falls by running out a tree-dam made from the heavy timber and stone, cross-tied with the trunks of other large trees, and strengthened in every way which Yankee ingenuity could devise. This dam

extended out into the river a distance of above three hundred feet. Four large navy coal barges were then filled with stone and brick, and sunk at the end of the dam. From the left, or south, bank—there being no timber there—a series of heavy cribs were constructed from material obtained by demolishing some old mills and barns, while the brick, iron and stone required to sink them and hold them in their place, were procured by tear-

ing down two large sugar houses, and by taking up a quantity of railroad iron, buried in the vicinity of Alexandria. In this work several colored regiments were employed, while the white troops



carried forward the work on the other side of the river, both details working day and night.

The width of the Red River at the lower end of the falls, the point where the dam was constructed, is seven hundred and fifty-eight feet, and the depth of the water from four to six feet, the current running about ten miles an hour. Night and day the work was carried on without cessation, the men working

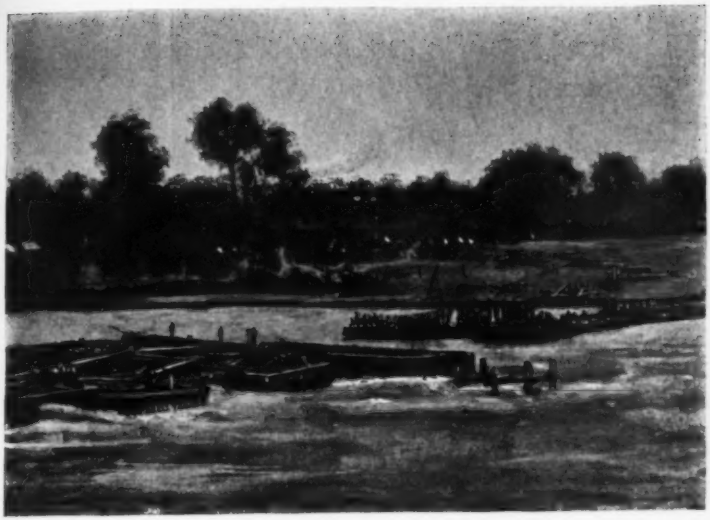
willingly and cheerfully, although many were compelled to stand up to their waists in water during the damp and chilly nights, and under a burning sun by day, and notwithstanding very many had no faith in the success of the great undertaking. The scene presented in the vicinity of the dam was novel and interesting. Oak, elm and pine trees, whose gigantic growth dated from the days of the daring De Soto, were falling to the ground under the blows of the stalwart pioneers of Maine, bearing with them in their fall trees of lesser growth; mules and oxen were dragging the trees denuded of their branches, to the river's bank; wagons heavily loaded were moving in every direction; flat-boats carrying stone were floating with the current, while others were being drawn up the stream in the manner of canal boats. Meanwhile hundreds of men were at work at each end of the dam, moving heavy logs to the outer end of the tree-dam, throwing in brushwood and branches of trees to make it tight; wheeling brick out to the cribs, carrying bars of railway iron to the barges, and in various other ways contributing to the completion of the work, while on each bank of the river were to be seen thousands of spectators, consisting of officers of both services, groups of sailors, soldiers, camp-followers and citizens of Alexandria, all eagerly watching our progress and discussing the chances of success.

At night the scene was even more striking and picturesque: The fires burning on both banks of the river, and at different points on the dam; the thousand swarthy figures at work on land and water passing to and fro; the camp-fires of the army which surrounded us on every side; the loud commands of the officers superintending the work; the noisy shouts of the teamsters; the sound of the falling trees, and the roaring of the rushing waters, formed in its *tout ensemble* one of the most impressive scenes we ever witnessed. Mingled with these sounds we often heard as we passed on our rounds among the men, the sweet strains of "Annie Laurie," or the martial notes of the "Battle Cry of Freedom," while at the other end of the dam, among the dusky members of the *Corps d'Afrique*, the popular refrain of "John Brown's body lies a mouldering in the ground," and some of those peculiar and plaintive plantation melodies of the South, would greet us as we pursued our way. It was while on duty one night, when such a scene as we have attempted to describe presented itself to the looker-on, that a silvery-headed contra-

band, who had just come into our lines, approached us, and throwing up both his hands in perfect amazement, exclaimed: "Well, 'fore God, what won't de Yankees do next!"

Passing on our rounds one morning about three o'clock, a colored soldier caused considerable delay by carelessly allowing his wheelbarrow load of brick, which were being used in the cribs, to run off the long track or gangway, thereby detaining for a few moments a line of thirty or forty African citizens, following behind. "Hit dat fifty-dollar nigga in de head wid a brick!" "Git dat wheelbarrer out ob de way!" "What doin' dar, nigga?" "Kick dat blind child into de ribber!" "Smash dat black man ober de shin!" "Now den, you be quick dar, mighty quick!" "What de debble de matter wid dat nigga?" "Mis'ble nigga, don't you knows you'se a working for your sculp? De Rebels git you, you is done gone, sure!" Such were of the utterances of which his sable fellow-laborers delivered themselves, while the captain of the squad assailed the culprit with certain pithy expressions not proper to be recorded. Feeling considerable sympathy for the subject of this deluge of abuse, we kindly inquired if he was tired. "Oh! Lordy, yass, massa Cunnel, I'se werry tired toten brick. It's a heap harder dan picken cotton."

During the construction of the dam, daily and almost constant skirmishing was carried on with the enemy, who were around us in strong force, and not only anticipated the capture of Admiral Porter's entire fleet, but made it their boast that the Army would be forced to surrender to General Kirby Smith. The dam they looked upon as a huge joke, and the salutation with which Union prisoners, whom the chances of war threw into their hands, were met, was: "Well, Yank, how's the dam?" Even the Rebel prisoners whom we captured during its construction could not avoid chaffing their captors by the question: "How's your big dam progressing?" The ridicule was not, however, confined to the camp of the enemy or to the Rebel citizens of Alexandria. We think we can safely assert that, until the work had progressed for a week, not ten per cent. of the officers and seamen of the Navy had the slightest faith in our saving their fleet. Indeed, we cannot now remember any officer, with the single exception of Volunteer Lieutenant Langthorne, of the *Mound City*, who, from the inauguration of the work, believed it would be the means of saving the squadron. The percentage of unbelievers in the Army was much less. Perhaps one-half had faith in its ultimate success.



VIEWS OF THE RED RIVER DAM.

From the Alexandria side of the River.

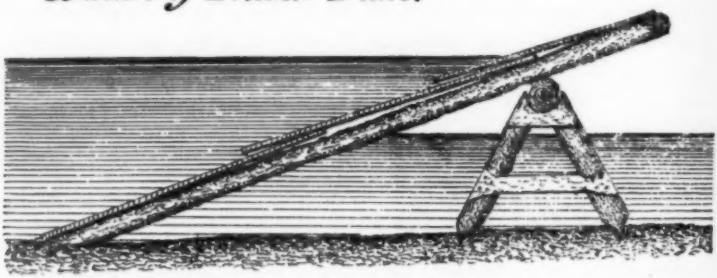
With many, the building of the dam was an endless subject of mirth, and numberless were the witticisms to which it gave birth. But the projector paid no attention to their jeers or jokes, nor did he ever for a moment lose heart or hope, but worked on manfully.

On the morning of the 8th of May, the water had risen sufficiently on the upper falls to allow three of the iron-clads to cross and proceed down to within a short distance of the dam. In another day, it would undoubtedly have been sufficiently high to enable all the other vessels of the fleet to pass the upper falls. Unfortunately, at five o'clock on the morning of the 9th, the pressure of the water became so great that it swept away two of the large coal barges that were sunk at the end of the dam, near the centre of the river. When the accident was observed, the Admiral rode to the point where the upper vessels were anchored, and ordered the *Lexington* to pass the upper falls, if possible, and immediately attempt to go through the opening in the dam, along which the water was rushing as fiercely as over the rapids at Niagara. The *Lexington* succeeded in getting over the falls, and then steered directly for the opening in the dam, through which the water was dashing so furiously that it seemed as if certain destruction would be her fate. Ten thousand spectators breathlessly awaited the result. She entered the gap with a full head of steam; passed down the roaring, rushing torrent; made several spasmodic rolls; hung for a moment, with a harsh, grating sound, on the rocks below; was then swept into deep water, and rounded to by the bank of the river. Such a cheer arose from that vast multitude of sailors and soldiers, when the noble vessel was seen in safety below the falls, as we had never heard before, and certainly have not heard since. Then all eyes were turned above the dam again, when another iron-clad was to be seen approaching. She did not fare as well as the *Lexington*, being considerably injured in the passage; but the other two passed through without any accident. It was perhaps a fortunate circumstance that a portion of the dam was carried away in the manner that it was, as the two barges that were forced out by the terrific pressure of the water swung round against some dangerous rocks, making a cushion for the vessels, and doubtless preventing, as afterward appeared, the certain destruction of a portion of the fleet.

The Army, not in the least disheartened, immediately com-

menced the reconstruction of the dam, but not to close the breach, that being left substantially as it was. The question originally was, whether we should make one dam at the foot of the falls, with an opening for the ships to pass through, with wing dams above, thus dividing the pressure, or trust all to one principal structure. The dam had been carried away because the whole body of water had been stopped at one point, leaving no passage for the escape of any portion of it; Lieutenant-Colonel Bailey therefore determined to leave the gap of about seventy feet, caused by the carrying away of the two barges, and construct a series of wing dams on the upper falls in accordance with his original plan, thus turning all the water into one narrow channel. Several of these were built on each side of the river, thereby increasing the depth one foot two inches, and enabling all the fleet to pass the upper falls. This was accomplished in three days and

Section of Bracket Dam.



nights, the wing dams being constructed in the same manner as the tree-dam on the north side of the lower falls, and on the fourth day the work was completed on the main dam, by which the depth of water was increased five feet four and a half inches—a depth sufficient to enable the largest iron-clads to cross. On the afternoon of the 12th, three of the gunboats, their hatches battened down and every precaution taken to guard against accident, safely passed the dam. Early the following morning the remaining five passed in succession, amid the cheers of the assembled thousands. By three o'clock that day the vessels were all coaled; the guns and ammunition, which had been removed to lighten the vessels, replaced; the pontoon bridge at Alexandria, laid down to facilitate operations on the dam, taken up; and the whole fleet, with its convoy of army transports, was steaming down the river, while the troops moved forward on the river road to cover and

protect them from the attacks of the enemy. A few hours later, after the rear-guard had left Alexandria, the enemy took possession of the town, and, with rueful and elongated countenances, gazed sadly upon the work of a Northern Army, whereby a fleet worth several millions of dollars, with a magnificent armament of powerful guns, which they had looked upon as their certain prize, had been rescued.

As the Admiral says in his report to the Secretary of the Navy: "This is, without doubt, the best engineering feat ever performed. Under the best circumstances a private company would not have completed the work under one year, and to an ordinary mind the whole thing would have appeared an utter impossibility. I do not believe that there ever was a case where such difficulties were overcome in so short a space of time, and without any previous preparation." The Colonel of the Fifteenth regiment Maine Volunteers testified before the Committee on the Conduct of the War, January, 1865, "that it was a very common thing among the lumbermen of Maine to build such dams, and that he had 150 men in his regiment who could build just such a dam," a statement which we presume must be taken *cum grano salis*.

The construction of the Red River Dam was almost exclusively the work of the Army. But little aid or encouragement was rendered by the Navy, except by Volunteer Lieutenant Langthorne, commanding the *Mound City*, who assisted in setting the heavy cribs and coal barges. The soldiers labored zealously night and day, in and out of the water, from the 30th of April to the 12th of May inclusive, when the passage of the boats below the upper falls was completed.

For the successful execution of this great work Lieutenant-Colonel Bailey, the Wisconsin farmer, was promoted to the rank of Brigadier-General of Volunteers, and received the thanks of Congress; while the officers of the Mississippi Squadron testified their high appreciation of his inestimable services to them and the country, by presenting him with an elegant sword and a purse of three thousand dollars, which were transmitted to him with a highly complimentary letter from Admiral Porter.

Joseph Bailey, it may be mentioned, who achieved this original and skillful feat of engineering, and who in his report says: "The plan of the dam was looked upon as wild and chimerical," was born at Salem, Ohio, on the 28th of April, 1827. He entered the

service as Captain Fourth Wisconsin Infantry, July 2, 1861, was promoted Major, May 30, 1863, and Lieutenant-Colonel, June 24th of the same year. His regiment was changed from infantry to cavalry in the August following. Bailey was promoted to the rank of Colonel, June 1, 1864, and appointed Brigadier-General of U. S. Volunteers, November 10,1864. He was breveted Brigadier-General June 7, 1864, "for distinguished and meritorious services as Acting Engineer of the 19th Corps in projecting and constructing a temporary dam at the lower falls of the Red River, thereby enabling our flotilla to reach the waters of the Mississippi in safety," and Major-General U. S.Volunteers, March 13, 1865, "for gallant and meritorious services in the Campaign of Mobile, Ala.," where he commanded the Engineer Brigade. His latest services were in the Military Division of the West Mississippi where he was in command of the Second Brigade, Second Cavalry Division, to June, 1865, and on leave of absence until he resigned from the service July 7, 1865. After the War, General Bailey settled as a farmer in Newton County, Missouri, of which he was the following year elected Sheriff. He soon became formidable to the Border ruffians, and after fearlessly going alone and arresting two brothers named Pixley, he was shot and instantly killed by one of the desperadoes with a concealed pistol, near Nevada, in Missouri, March 21, 1867.

The officers who had the honor of assisting Bailey in the construction of the famous dam were Col. Jas. Grant Wilson, of General Banks' staff; Col. Charles C. Dwight, Inspector-General 19th Army Corps; Lieut.-Col. W. B. Kinsey, 161st Regiment New York Infantry; Lieut.-Col. N. B. Pearsall, 97th Regiment U. S. Colored Infantry; Major Charles G. Sawtelle, of General Franklin's Staff, and Lieutenant Langthorne, the only officer of the fleet who, from the inauguration of the work, believed it would be the means of saving the Mississippi squadron.

In answer to inquiries made as to the condition of the Red River and Bailey Dam at Alexandria, the following statement dated March 23, 1885, has been received from Capt. Eric Bergland of the United States Engineer Corps:

The central portions of the Bailey Dam still remain in position. Portions of the crest have been washed away or otherwise removed, but the general line of the crest still extends about five feet above low water. Most of the timber used in the construction of the dam is as sound as when placed there more than twenty years ago. A deposit, mostly sand, has formed at the front and back of the dam.

The effect of the dam has been the gradual erosion of the west bank and formation of a wide sand bar along the east bank. The amount of erosion during late years has been about twenty feet per annum, and the total amount of erosion at the upper part of the town amounts to nearly 250 feet in twenty years.

The new channel, near the west bank, has been for years considered by steamboat men to be the best channel through the lower falls. It is now contemplated to close this channel by a dam, the material for which is to be obtained from the cut through the upper falls.

From information derived from the old inhabitants of Alexandria, it appears that many years ago, in order to stop the caving along the front of the town, the authorities attempted to blow up the Bailey Dam near the east shore, and restore the channel to its original position in the river. They destroyed part of the dam, but failed to benefit the town or make any change in the channel.*

Perhaps I may be permitted to mention a little incident of the late war which has a bearing on the Bailey Dam. When General Jackson was moving to strike the flank of McClellan's forces on the Chickahominy, he came to a stream which had no bridge, and could not be crossed without one. The Confederate general had brought with him from the Valley a rough, uneducated man of the Bailey type, full of energy, who had served him faithfully in many emergencies, and in whom he had the utmost confidence. He called this man and told him that stream must be bridged immediately; the regular engineers were also advised of the fact. In a short time the rough carpenter and the polished men of science were at the stream; the former had his plan, the latter theirs. He wished to go to work at once without drawings, but they objected until they could perfect the plan on paper. The engineers retired to their tent to prepare a paper bridge; the carpenter took his men and went to work to make a real one. In a very short time he appeared at "Stonewall's" tent, and briefly reported thus: "General, that bridge is done, but them pictures aint come yet."

* The following is an extract from a letter to the Sec. M. S. I. of date March 17, 1891, from Captain J. H. Willard, U. S. Engineer Corps, who is now in charge of River and Harbor Improvements in the district which includes Alexandria, La.:

"As Bailey's work was done at low water when the slope of Red River is generally the greatest, the following information, derived from water-gauge records, may be of interest. The elevations refer to mean gulf level at Biloxi, and depend upon precise levels."

	At Alexandria. Feet.	Mouth of Red River. Feet.	Difference. Feet.
High water	80.05	51.36	28.69
Low water	39.50	2.59	36.91
Range	40.55	48.77	

I have mentioned that General Grant never approved of the Red River campaign, which was originated at Washington, and was a favorite project with General Halleck as early as December, 1862. For this reason the Lieutenant-General did not wish to oppose it. The statement has also been made that General Banks was not in favor of the expedition.

Among the various causes that I cannot dwell upon, which rendered the campaign unsuccessful, was the inability of the Navy—owing to the rapid fall of water in the Red River—to cooperate with the Army. But even had we reached and successfully occupied Shreveport, nothing would have been gained, as General Grant, who required the troops sent by Sherman for the famous march to Atlanta, would have ordered its evacuation. This I have direct from the great soldier himself.

A single word in conclusion.

During the two decades that have passed away since the occurrence of the fruitless expedition in the Red River country, how many of our comrades who participated in the campaign have joined the bivouac of the dead. Canby, who assumed command of the troops at Simmsport on the Atchafalaya, and his aide-de camp Meyer; General Ransome, wounded and reeling in his saddle at Sabine Cross Roads; Richard Arnold of the artillery; Davis of the Illinois cavalry; Benedict, who fell at the head of his brigade at Pleasant Hill; Bailey, the builder of the dam; and many other brave and gallant spirits, have gone hence to be no more seen of men:

Their good swords rust,
And their steeds are dust,
But their souls are with the Saints, we trust.

Reprints and Translations.*

TWO BRIGADES

From the German of CAPTAIN FRITZ HOENIG.

BY CAPTAIN PAUL ROEMER, U. S. A.

(By permission of the publisher, F. Luckhardt, Berlin.)

INTRODUCTION.

THE state of perfection to which fire-arms have been brought in a comparatively short time, makes one ponder over the question: What further improvements are yet possible, and what system of tactics must we employ to meet still greater rapidity and accuracy of fire, flatter trajectory and increased penetration? Geniuses of all armies seek formations, and means of attaining a military system of high efficiency, which will prevent great losses—a problem of infinite interest, and in which all arms are concerned.

It is the infantry in the first place, that is affected by the improvements in fire-arms and the increased importance of their fire. However, fire-arms can never change the fundamental tactical laws of the different arms. Infantry is and will remain the first power on the battle-field; to it will be assigned, now as ever, the great work of carrying through and deciding the battle. Its performance on the field of battle can never be replaced with mass-fire by another arm in a combat at great distances.

Infantry must come to close combat, carry the enemy's position and hold it.

As it is the infantry's task to decide the battle, so it is the task of the artillery—in our opinion the second power on the battle-field—to open the battle, and prepare for the decisive moment, which does not, however, exclude it from taking part in close combat (the moment before and after the decision). Close combat for the infantry, and combat at great distances for the artillery, characterize the performance of these arms. They are the principal arms on the battle-field. The third place during a battle, belongs to the cavalry, the fourth to the pioneers (engineers). Both are, in the present state of our tactics, auxiliary arms. That the cavalry at the battle of Vionville—Mars-la-Tour—did nevertheless take a prominent part is no proof against our statement.

* Please address communications concerning reprints, translations and reviews to Lt. J. C. BUSH, editor of this department.

The case remained an exception. A similar one did not occur again either in the French or the Russian-Turkish war.

The enemy's conduct at Vionville—Mars-la-Tour—made success possible, while all attempts of the French cavalry, in spite of their sacrifices, never had any influence upon the progress of a battle.

In close combat and in a combat at great distances, the cavalry will act now as before, whenever opportunity for success offers.

But with the increased range and greater rapidity of fire, which cannot be compensated for by greater speed and more rapid movements, the sphere of the cavalry on the battle-field has been reduced. Its opportunities for attack are transient, its command has become more difficult.

Before and after the battle, cavalry will maintain its place as principal arm.

It is not our intention to write a treatise on the tactics of the different arms. We will, rather, take two examples from military history, and deduce from them the tactical formations which infantry must employ under the present destructive fire.

Many thoughts and much labor have been bestowed upon the subject of tactics in the last decade. If the results were only in right proportion to the time spent, and pains taken! A theory, which does not rest upon a foundation of practice and experience, will never lead to correct conclusions. The question arises, is there enough experience at hand, that we can say: "Infantry must be employed on the battle-field in such or such a way."

In our judgment; yes.

Notwithstanding that this experience exists, and that the tactical formations of infantry have been newly regulated, the philosophical speculations upon the subject of tactics continue. Much that is useless has been brought to light of late; new thoughts should, however, not be rejected without careful examination.

We know that the Russians fought at Gorni Dubnik the whole day without success. In the evening, a dark one, the same troops attacked the same position which they had stormed in vain all day, defended by the same opponent, and took it without firing a shot, and with but little loss. This encounter is certainly remarkable, but it is not new. If classified tactically, it should come under the head of surprises, which are as old as tactics.

This encounter caused a great stir among military talents, and led to new contests on the tactical field. Some went even so far as to recommend night attacks as a rule, on account of this exceptional case. At least in no other way can we explain the sensation created by a brilliant and spirited article, published in the *Berliner Fremdenblatt*. This article, "The Next Battle," was reprinted in nearly all German, French, English and Italian military journals, and aroused much interest in Switzerland, Belgium and Holland.

We grant that in the future night attacks will occur, and can be carried through just as successfully as the one at Gorni Dubnik; but that they will remain an exception is certain. The incentive to attempt the defeat of an enemy in a night attack, with prospect of little loss, whom we cannot

hope to defeat in day-time, has increased with the improvements of fire-arms. It is easily understood how some, in view of the great losses in every battle fought by day-light, will be led to attempt by night, what they would not dare to undertake by day. But one who will take the trouble to examine this matter a little closer, will soon come to the conclusion that it is much better to risk the fortune of battle in day-light than at night.

We must not forget to take human nature into consideration; the best disciplined army will retain all its weaknesses. It is human nature that will figure as the main point in tactics, and not fire-arms. In a combat by day-light, the influence of the leader, upon whom the result of the battle in a great measure depends, has already been considerably reduced on account of the extended formations. It will be lost almost entirely in a combat at night. Accident and luck are the companions of the soldier. In tactics everything uncertain must be avoided. When a battle is fought in darkness, the result is left entirely to chance.

Our article will endeavor to oppose this dangerous tendency. We also disclaim the idea of establishing shelter and protection for infantry against hostile infantry fire. We further object to the idea of using the spade in connection with an infantry attack, except in case where infantry has arrived within effective range of the enemy's infantry fire in a perfectly open country, and when it is compelled to maintain a position in front of the enemy for some time. Once established behind breastworks, it will be no easy task to attempt to lead infantry across an open space and under a destructive fire against the enemy. Whoever regards this as possible, has formed erroneous ideas about the conduct of a battle. He knows nothing of the psychology of man. Upon it we lay great stress.

In the history of tactics, we meet with longer or shorter periods, in which established formations were adhered to so long as they were sufficient to overcome the enemy.

These periods embraced centuries in ancient times, and in the middle ages. Since the discovery of gunpowder these periods have been shorter. Are the adopted formations no longer sufficient when opposed to improved armaments? Then new ones must be sought for.

The tactical formations under which the man, the different arms, the whole army are employed, are mainly determined by the armament. And that we live in a period where the old formations no longer correspond with the new armament, is admitted by all.

Frederick the Great devoted a lifetime to the improvement of his tactical system. The introduction of breech-loaders upset the whole work. A new problem lies before us.

Times are different, fire-arms more perfect.

The Great King could advance with his armies in closed lines, without being compelled to halt, to lie down, to seek shelter, advance, halt again, etc. He could approach the enemy in good order, with perhaps trifling loss at the longer distances, engage him, and cover him with a steady, destructive fire, which then excited the admiration of the world, and became a terror to the enemy.

To-day hundreds will break down under fire at a distance whence the

enemy can scarcely be seen, still less battled with. Great distances are covered by a destructive fire. The question is: How to pass over this dangerous space with the least possible loss, and without becoming *hors de combat* before gaining a position close enough to engage the enemy, to cover him with mass-fire, to weaken him physically and morally.

The excellent fire-arms of the present day enable the defender to enjoy an important advantage before the final decision of a battle. All attempts to place the assailant in the same favorable situation must remain fruitless.

The assailant must advance and expose himself, not so the defender. From the increased effect of the enemy's mass-fire, comes the necessity of guarding our forces carefully. Tactics should furnish us with means to accomplish this.

The last German wars, as well as the war of Russia against Turkey, have given us sufficient points upon which to build up new tactical formations, notwithstanding the inequality of the armament, and the difference in the organization and tactical formations of the opponents.

We will introduce two examples: "The attack of two brigades." We took part in both actions. Both occurred some time ago, still it seems to us that they are well adapted to illustrate the changes in tactical formations.

We refer to the attack of the 28th Infantry Brigade in the battle of Königgrätz on July 3, 1866, on the farm of Bor, and the adjoining strongly fortified forest; and the attack of the 38th Infantry Brigade on the heights of Bruville in the battle of Vionville on the 16th of August, 1870.

The first represents the battle of breech-loaders against muzzle-loaders (close of the old, and commencement of modern tactics).

The second represents the battle of breech-loaders against breech-loaders (modern tactics). The first attack was carried out with numbers equal to those of the enemy; the second with greatly inferior numbers. In both cases the attack was made over open country, and the defenders in both were tactically and morally equal to the assailants.

FIRST PART.

The attack of the 28th Infantry Brigade on the farm of Bor, and the adjoining fortified forest of the same name in the battle of Königgrätz, on the 3d of July, 1866.

(a) March to and formation on the battle-field. The battle-field.

It was about 2 P. M. on July 3, 1866, when the 28th Brigade had completed its formation northwest from the heights of Popowitz.

From our former position near Alt-Rechanitz, on the right bank of the Bistritz, we could fairly well observe the progress of the battle. Here we stood as if separated from the world. We saw nothing, and we could not be seen.

The short march from Alt-Rechanitz had taken more than an hour, a circumstance mainly due to the fact that the reserve artillery had received orders to cross the Bistritz at the time we were about to cross. The bridge was too narrow for two columns to pass over at the same time. The 28th Brigade halted to allow the reserve artillery to pass, otherwise it would

have been too late for the opening of the battle. So it happened that one movement was interrupted by another, and to the time already lost, more lost time was added.

This was not the fault of the 14th Division and 28th Brigade. The mistakes were made at army headquarters, where the morning hours had not been used to full advantage; no provisions for the necessary crossings were made, and those at hand were permitted to be used improperly.

The history of the war by the Prussian and Austrian general staff mention nothing of this incident. We only read in the Prussian work, page 368, that the 28th Brigade followed the 27th within 800 paces. Why this distance between two brigades, whose participation in the combat was very much needed? We know, 1st, that the distance was greater; 2d, that it was an involuntary one.

The consequence was, that the 27th Brigade, although it had marched a greater distance, attacked before the 28th. Could this have been the intention? In the progress of the action the 28th Brigade did not come up again with the 27th Brigade, although hastening its movements whenever opportunity offered.

The 28th Brigade formed in two lines behind the heights of Popowitz, facing southeast. Two battalions * of the 57th Regiment formed the first, two battalions † of the 17th Regiment, the second line. High rye fields covered the heights of Popowitz and the space up to the heights of Problus-Prim. The battalions were aligned as if on the drill ground, with their commanders in front. After a thunderous cheer for the King, followed by the shout of Colonel v. d. Osten (57th Regiment), "And now God with us," the regimental colors were unfolded, and every man felt the importance of the moment. Our men who had never heard the thunder of cannon before, except at Münchingrätz, and who had occasion to observe to-day for several hours, the columns of the First Army moving back and forth in the midst of a great battle, were full of attention and expectation. They had marched 23 kilometers over muddy roads, and at times across the fields. They had been already ten hours under arms, without anything to eat or drink. Having received orders early in the morning, the 28th Brigade had broken camp and at 9. 30 A. M. stood behind the right wing of the First Army. From there it marched south and arrived at Alt-Rechanitz at 10.30 A. M. Here the men were compelled to wait, because no sufficient arrangements for crossing the Bistritz had been made. Their early march was fruitless. But once the anxious hours were passed and the regiment thrown into action, it became an example for all. The higher officers, especially by the calmness and determination with which they acted, inspired the men with confidence and trust. Toward mid-day the weather cleared. Heavy clouds of smoke moved from the centre of the battle across the valley of the Bistritz. Flames were rising to heaven from nearly all villages. A great decisive battle was in progress.

At the command: "Brigade march," the columns commenced to move. The 1 and 3 Company of I/57 formed the advanced line, the 2 Com-

* The II. Battalion 57th Regiment detailed to support artillery reserve.

† The Fusileer Battalion of 17th Regiment was with the advance guard of General v. Schöler.

pany * I/57 in the second line opposite the centre of the advanced line, to its right F/57,† to its left I/17; in reserve behind the centre of the second line II/17. Without seeing anything to our right or left, except our own troops, we arrived on the ridge of the heights of Popowitz. The regimental bands commenced to play, and now the overpowering spectacle of active military life was presented to our eyes.

The whole hostile front from Prim-Problus and from Stresetitz to Lipa and Chlum was partially concealed by flames and smoke.

Between Prim and Problus a grand array of artillery could be seen, and this side of it, as far as the eye could reach, swarms of skirmishers, advancing columns, flying colors; calm, certainty, determination in everything and in everybody.

A lively and well-directed artillery fire received us; but without a halt, we advanced until we arrived within 240 meters of the intrenchments of the forest of Bor and the adjoining farm of the same name.

The field of action of the 28th Brigade was in a wide trough about 2000 metres long, which extended from north to south between the heights of Popowitz and Problus, with the lowest point in the centre between the heights. A country road skirted with trees led from Popowitz to the highway Lubno-Nieder Prim. With this exception, the whole field was perfectly open, and offered absolutely no cover; while the remainder of the Elbe Army could approach the enemy's position under cover within 300 to 700 metres.

(b) The attack.—The brigade had scarcely reached the point where the road from Popowitz meets the highway Lubno-Nieder Prim, when continued hurrahs in advance, and to the right and left were heard. It was the victorious cheer of the stormers of Problus and Nieder Prim.

Soon afterwards Major v. Thiele, the general staff officer of the 14th Division arrived, and directed the brigade to the heights between Problus and Prim which had been evacuated by the Saxon Artillery, and were at this moment occupied by the 12th Saxon Infantry and the 4th Saxon Chasseur battalions. They received us with several vollies, causing little loss. Schmelzer's smooth 12-pdr. battery had followed the movement of the 28th Brigade. Now it advanced at a gallop, and passing through the skirmishers of the 3d Company, 57th Regiment, came into battery within 400 paces of the enemy and opened fire with case-shot. We never saw a more determined and gallant action, and such a thorough understanding of the tactical situation.

The result was complete and formed an initiative which not only caused great losses to the enemy, but increased the confidence of the attacking infantry to boldness. The example shows what great moral effect artillery will have upon the other arms, when properly used. The order of the battery commander: "With case-shot at 400 paces direct fire," sounded like a shout of victory to the skirmishers of the 1st and 3d Company away back in the second line of the brigade. After a few shots the enemy's infantry

* The fourth company of I/57 with artillery reserve.

† F stands for Fusileer Battalion; the Roman numbers stand for battalions, the Arabic for companies; the number under the line is the number of the regiment.

retreated. Battery Schmelzer advanced up to the ridge of the heights, and opened an effectual fire upon the retreating battalions, and upon the farm of Bor and the intrenchments of the adjoining forest. The skirmish line, 1st and 3d Company 57th Regiment followed battery Schmelzer at double time; 2d Company 57th Regiment, was, as before, in closed formation behind its centre. With it were the brigade and regimental commander, and also for a moment the general staff officer of the 14th Division.

The ridge of the height was covered with many killed and wounded. A wheel to the left had to be executed, in order to gain direction towards the farm and forest of Bor. The conduct of the brigade up to this moment deserves the highest commendation. Interval and alignment had not been lost for a moment, and after the brigade had marched 1500 meters across an open country, and suffered severely, it arrived in such good condition on the high plain of Problus that the change of direction to the left could be executed, *without coming to a halt*, under a steady fire of the enemy.

In executing this delicate movement, the brigade commander, General v. Hiller remained calm and collected. His gallant behavior had a good effect upon the brigade; it remained steady.

The change of direction had placed the skirmish line a little too far north, which made it necessary to extend it to the southeast. Two Züge of the 2d Company 57th Regiment were deployed, and in double time came into line with the skirmishers of the 1st and 3d Companies 57th Regiment. Soon afterwards the whole advanced line halted (240 meters before the forest of Bor).

Now it could be seen that the position was strongly fortified, and from it a continuous skirmish fire was kept up. Although in close proximity of the enemy, no correct estimate of his strength could be made.

General v. Hiller saw at once that, upon this level plain, without the least cover, every moment lost would be dangerous to his command, and concluded to attack the forest as quickly as possible. For this purpose he ordered the second and third line to close up on the advanced line of skirmishers.

The movement succeeded splendidly, but hardly had the second line reached the first, and the united forces commenced to push forward, when the signal "Cavalry," sounded from all sides. It was a serious, yes, critical situation.

The brigade stood upon a perfectly open plain, 240 meters before a strongly fortified position, occupied by six battalions.

The skirmishers assembled at double time, the battalions formed squares, anxiously waiting a minute or two.

No cavalry appeared. Two troops of Saxon cavalry had lost their way in the forest of Bor, and suddenly appeared on this side of it. As soon as they found out their mistake, they wheeled about and trotted off in great haste. This was the whole affair.

The trivial incident had brought the movement to a stand-still, and shows what mischief signals will cause, when sounded before the situation is clearly understood.

If the signal had not been sounded, the intrenchments could have been stormed with little loss, and many prisoners taken.

In our opinion all signals on the battle-field should be prohibited, except the signal: "The whole command advance."

There is only one instrument for the battle-field—the drum—and it should always be at hand. Its signal means "Forward, forward."

In this annoying pause General v. Hiller took the initiative. Squares were deployed without delay and the intrenchments stormed. It was too late. The Saxons, fully understanding the situation, had made good use of the interruption, and evacuated the forest.

The tactical management of the 28th Brigade must be called an excellent one. It might be said, that the brigade should not have formed squares, and we were told once, that General v. Hiller should have attacked, in spite of the signal: "Cavalry." To this we answer that at this moment the third line had not yet closed up, and to undertake an attack upon a strong position, under these circumstances, would have been a mistake. Besides, the appearance of the cavalry was by no means expected. What would have happened then, if the assailant had been attacked in flank and rear, with a strong, well-defended position in front? No, General v. Hiller's position was critical, and he could not have acted better than he did.

Climbing over the intrenchments had caused some delay and disorder to the command, and the general ordered a halt on the road from Bor to Steinfeld. The battalions and companies had just assembled, when the enemy commenced to shell the forest of Bor, and again the signal: "Cavalry," sounded. The brigade took position on the edge of the forest, and waited for several minutes, but no cavalry appeared.

The battle for the 28th Brigade was at an end.

It took position at the farm, and in the forest of Bor, and bivouacked there for the night.

The brigade had lost 10 officers and 190 men, and had captured two officers and 200 men.

Before it came within range of the enemy's fire, the brigade was formed in two lines; afterwards in three. It remained in this formation until the first halt was made (240 meters before the intrenchments). The regiments stood behind each other. During the advance, the brigade executed a change of direction to the left. Under an effective fire it changed from an open to a close formation, and then deployed again; it attacked a strong position, climbed over intrenchments, followed the enemy through close underbrush, and ten minutes afterwards assembled again, in good condition. All movements were carried out as if on the drill ground. The brigade passed over 2000 meters with skirmishers in front.

The skirmishers commenced to fire 240 meters from the enemy's position, they fired on the march, and with good effect, as could be seen afterwards. The strong columns of the second and third line suffered comparatively little loss; the old Saxon fire-arms did not carry far enough.

All mounted officers, also the company commanders, remained on horseback during the whole action.

The attack of the brigade deserves to be called a model attack.

(*To be continued.*)

THE DEVELOPMENT OF MODERN ARTILLERY.

By CAPTAIN THE HON. RANDOLPH MOSTYN, R. A.

(*Reprinted from the United Service Magazine, London.*)

"THE development of modern Artillery" is a phrase well known not only to soldiers, but also to the general public. On no question, however, is the general public, nor for that matter are military men themselves, less well informed. The reasons for this are not far to seek. Artillery is a special subject, which has made great strides of late years. Its groundwork is seldom treated of, and its essential details are but lightly dwelt on. Further, it is entirely a fire-effect arm, and cannot be exhibited to special correspondents and London sight-seers on the Aldershot manœuvring grounds. The public, therefore, is unable to instruct itself, and consequently regards with little interest and no power of criticism the theories which enthusiasts and minor specialists occasionally ventilate in Service papers and magazines. Nevertheless, special though the subject be, it is much simpler to understand, and much more full of real and speculative interest, than are the tactical assaults of infantry, or the strategical meanderings of crawling columns.

The interest, as I have hinted, centres itself in the fire effect, and the key to this is furnished us annually by the practice camp which is maintained on Dartmoor. Let us proceed there at once, then, and possess ourselves of this year's key.

The camp is perched some five hundred feet above the town of Okehampton. It is pitched in a rough pasturage on the very borders of Dartmoor; in fact, the watering trough for the horses is on the moor itself. From the back of the camp you obtain a view of a valley which is known as Number One range. It lies nearly North and South, and is hedged along its further length by three hills, the highest of which, "Yes Tor," is the most imposing one on Dartmoor. Yes Tor, in fact, dominates the whole country, and on its summit waves the red danger flag whenever the batteries are at practice. At the north end of the valley, and nearly closing it, is a round elevation, known as the Holstock Down, the whole summit and slopes of which are available for manœuvring batteries and bringing them into action. Stretching out from the base of Yes Tor, right across the valley, at ranges of about two thousand and four thousand yards respectively from the summit of Holstock, are two ridges, known as Blackdown and Longstone Neck, which, together with the slopes of the hills themselves, present numerous positions, some open and some partially or even entirely concealed, on which all descriptions of targets can be arranged. Blackdown itself offers a choice of advanced positions where guns can be brought into action; while, to the right rear, East Hill offers another position into which guns can be retired; but in this case the range lies somewhat transversely to the valley. Nearly parallel to Number One

range, and on the other side of the three hills, lies Number Two range, which offers no such choice of firing position as Number One, but numerous and trappy points where targets can be put out. Parallel to this again, and in a deeper valley than either of the others, lies Number Three range; but being considerably flatter and simpler in conformation it is the least instructive of the three. In their main aspects, however, the three are as one. They are totally uncultivated, and consist entirely of patchy barren and purple moorland, green marsh and grey stone. Not a tree, not even a shrub, breaks or defines the irregular monotony of the undulating expanse. There no aid is lent to the eye to discover features and reckon distances. On the contrary, the successive rises and dips of the necks and downs merge into each other and into the sombre background presented by a high ridge of hills, some four or five miles away. Against this blending of sombre lines nothing stands prominently out; the targets are, therefore, almost indistinguishable; and the sun when it does light the landscape only seems the more thoroughly to conceal them by shining, as it does, always on their backs and leaving their fronts in shadow. The mists and the rains coming also always up the valley towards the guns often render glasses and telescopes useless. And the soft ground smothers the bursts of the common shell, rendering observation difficult; and also, by fatally interfering with the ricochet of the shrapnel bullets, considerably discounts their effect.

So far, then, as the ground and the light are concerned no more difficult ranges than the Dartmoor ones could be discovered, and, therefore, no more instructive ones; and in judging the shooting and estimating its value these depressing conditions should not be lost sight of.

With regard now to the personnel. The camp has a staff consisting of a commandant, a staff adjutant, a range officer, a recording officer and an instructor from the Shoeburyness School of Gunnery, and in addition a range-finding officer was attached this year from Aldershot. The batteries arrive in four successive divisions of three batteries each, under a lieutenant-colonel, and stay for a period of from three to four weeks. One battery in addition is permanently established at the camp, and is used for two purposes: first as a machine to be handled by the officers who are assembled monthly to go through a course of instruction; secondly as a machine for carrying out particular suggestions and experiments of the Ordnance Committee.

The general programme for each detachment is, roughly speaking, as follows: The first week is devoted to elementary practice, which means that each battery is left under general instructions in the hands of its own major. The second is devoted to what is called "service practice." Here, though the batteries are still under the command of their own majors, who are not interfered with unless necessity arises, yet the shooting is under the direct personal superintendence of the commandant, whose staff arrange the targets and record times, effects, and expenditures. Lastly, the lieutenant-colonel commanding the division has three days allotted him in which to conduct "brigade practice," *i. e.*, to mass the batteries and carry out a scheme resembling as much as possible the probable action of a division of artillery on service.

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It will be seen that this programme allows considerable latitude to officers commanding batteries and divisions for developing their own qualities of command, and for experimenting on the treatment of many matters that are undoubtedly continually calling for improvement. It is needless to say, therefore, that it gives general satisfaction to the active officers of the regiment; it also gives a better index of their efficiency than if they were more controlled by the pedagogic element.

For a proper understanding of our subject we must now devote some attention to the matériel. Broadly speaking, there is, perhaps, no matter with which artillerists are more thoroughly satisfied than with the type of weapon which has been adopted in our service, viz.: the twelve-pounder breech-loader. It may have certain drawbacks; it may on certain points be inferior to others; but it must be borne in mind that it is the balance of advantages which determines the value of a weapon, and not necessarily its greater accuracy in shooting or the greater destructiveness of each shot fired from it. Even on these main points, however, so far as the gun itself is concerned, the type in question is in reality second to none. But now, to one main feature common to all modern weapons it is desirable to call particular attention, and that with no retrogressive aspirations, but with a view of correcting a very prevalent error. I refer to the enormously increased velocities of the projectiles. For this increase of velocity means that to reach a certain point the projectiles fly flatter or more parallel to the earth's surface than if they were propelled with less velocity; which means that ranges require much less elevation than they use to; which again means that any slight error in elevation, from whatever cause it arises, makes an enormously greater difference in the range than it used to, which again means that accurate shooting is less easy than it used to be. Of course this is contrary to generally received notions. The public has been told that a most wonderfully accurate and far-ranging weapon has been supplied, and that commensurate results will necessarily ensue. But they will not unless the training of the men and the reliance which can be placed on them in action is equally improved. On this account certain sensational attempts have, I believe, been made to influence the public mind in a retrogressive direction, but as I said, with these attempts I have no sympathy, and, at least as far as the training of the men is concerned, it is sufficiently attainable so long as there is no starving of ammunition, or of opportunities for regular practice.

There is a further point in connection with these high velocities which deserves notice. It would seem at first sight that, though the flatness of the trajectory presents a difficulty to accurate ranging, yet it should considerably improve the death-dealing quality of the shrapnel. To understand this thoroughly we should perhaps just state that there are two projectives in common use in the service—the common shell and the shrapnel shell. The common shell is a mere box of powder with a percussion fuse at its end which goes off as soon as the shell strikes the ground, and so explodes the powder. It has no destructive effect, but there ensues a large volume of smoke, and, according as this column of smoke appears to be in front of or behind the object you are shooting at, so you know whether you have too

much or too little elevation on your gun and can alter your elevation accordingly. Having found the correct elevation you proceed to use shrapnel, in order to destroy the enemy. A shrapnel is of the same weight as a common, but it consists of a metal case enclosing a number of leaden bullets and one little chamber filled with a small charge of powder, and a fuse which begins to burn automatically when the shell leaves the gun, and is so arranged as to explode the powder in the chamber at any given instant, thus bursting the case and liberating the bullets, which fly forward in a shower, which gradually expands in the form of a cone. Now, it would seem at first sight that the flatter the trajectory of the shell, the flatter will be the course pursued by the bullets, and the greater, therefore, the depth of ground which they will sweep. But this is not so. For, in order to make a shell travel in a straight path, without wobbling or turning over, it is necessary to give it a spinning motion. This is imparted by the rifling of the gun, and is called the "motion of rotation" in distinction to the "motion of translation," which means its forward movement. Now, the greater the velocity of translation, the greater has to be the velocity of rotation, in order to keep the shell equally steady, and this unfortunately has an effect on the liberated bullets, making their cone of dispersion greater, *i. e.*, making them whirl away from each other, up and down, right and left. Very few of them travel along the path which the shot would have pursued if it had not burst, and, to borrow a term used of sporting guns, the pattern becomes irregular and wide. The width is further increased by the modern practice of placing the bursting charge in the head of the shell, *i. e.*, in front of the bullets instead of in the base behind them. Now, the evil of a wide cone of dispersion can only be obviated by bursting the shell close up to the object aimed at, and this requires, of course, a corresponding increase in accuracy and judgment, *i. e.*, training, over the old days of muzzle-loaders and slow velocities. These facts, which are almost entirely lost sight of by the pedagogic and self-dubbed modern school of artillerists, will go far to explain certain confounding results with which we will presently deal.

We come now to another special development of modern artillery, which claims our special attention, and that is the system of using the weapon and projectile to the best advantage. In the old days of smooth-bores and round-shot, the battery, having been brought into action by the major, received general instructions from him, and each gun then passed to the separate control of its Number One, who observed, so far as he was able to, the pitch and burst of his own shot, and accordingly altered his scales and fuses so as to obtain the best effect. At the short ranges at which artillery engaged in those days this was feasible; and perhaps it was the only feasible way of fighting the guns. Then, with the first rifled guns, considerably increased ranges came in; the same system was adhered to, with the result that occasionally the fire was entirely wasted. It was, in fact, very soon obvious that men could not be relied on either for observing the effect of their shell or for making the necessary corrections. Commanding officers, therefore, soon saw the necessity of separating the observing duties from those of serving and firing each particular gun, and also of retaining in their own hands the control of correction. Finally, with the still more greatly in-

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creased ranges of modern guns, a definite and rigid method, known as the bracket system, was introduced and enforced throughout the service.

The system is of course very simple. It is merely a process of eliminating. You look at the object and guess its range. Say you guess two thousand yards. You fire a shell at the corresponding elevation, and observe whether it falls beyond or short of the object. Say it falls beyond. You then fire a shell at one thousand yards' elevation and observe it. If it falls short you know that the object is between one and two thousand yards from you. You have got in fact a bracket of one thousand yards within which the object stands. You now fire a shell at fifteen hundred yards' range, and, having observed it, you then have a bracket of five hundred yards within which you know that your object stands. So you keep halving till you find your shell striking the object. Evidently the determination of the range by this method is the quickest and surest and simplest conceivable. All that you really have to do is to observe whether each successive shell falls short of or beyond the object. The rest, you may say, works itself. And, to facilitate the observation, it is directed that the shell shall be thrown to the windward of the object, so that the smoke, which arises in a column or cloud after the burst, shall be blown across, either in front of or behind the object. For this a large puff of smoke is most desirable, and no shell could better fulfill this condition than the present pattern of steel common shell.

But is the whole affair in reality as simple as it looks? It is not. There are certain conditions which are essential, if the range is to be determined with the accuracy necessary for effective fire.

1st. The guns must continuously shoot with equal strength.

2d. The sighting and laying must be perfectly accurate.

3d. The smoke of the exploded shell must in no way be obscured, and the wind must blow across the range.

4th. The observer must be above the level of the general lie of the ground.

5th. There must be no trap in the ground.

The first condition—the accurate shooting of the guns—depends on their bores and elevating arrangements, the weights of the projectiles, the constitution of the powder, the accurate adjustment of the sights, and the mean of the sight brackets. Of all these points it may be said that they require nothing more than the constant attention of those in charge; still, it is necessary to bear in mind that if cartridges of different dates are indiscriminately used, if shells are inaccurately filled, and if sights are not frequently tested both with reference to their own gun and to one another, the accurate determination of a range will be impossible. Most probably in campaigning some inaccuracy would arise from these sources.

The second condition—accurate laying—is a matter of ability, instruction and means. I do not propose here to discuss the telescopic sights, so dear to our modern school of artillery, but will only notice that even in the barrack square, and more so at practice on the ranges, especially when time is an object, even the best and most reliable layers make a percentage of errors in setting up the elevation, and a further percentage of error in the

actual laying, and this, whether with the ordinary or with the telescope sights. I may also observe that, judging by the practice at Okehampton, there is no appreciable advantage gained, except, *perhaps*, at extreme ranges, by the telescopic sight over the ordinary sights; and I will confidently predict that, owing to its greater complication and limited field of vision, the telescopic sights will lead, in an actual engagement, to a large increase in the percentage of grossly inaccurate laying or of abnormal rounds which fatally interfere with the rapid and accurate determination of ranges.

The third condition concerns the visibility and direction of the smoke. Here we should notice that the smoke-clouds of the enemy's guns may effectually conceal the limits of the skill you are directing against them, or, at any rate, will demand a very nice and discriminating exercise of observation. The latter requirement is also essential when the wind is blowing up or down the range.

The fourth condition simply means that you actually cannot observe the burst of a shell unless you can see the ground it bursts in. If a target is so placed behind a ridge or crest line that you can only see its top and none of the ground between the crest line and the foot of the target, the thin rising smoke gives too small a datum from which to say precisely whether the shot was over or under. And here we may notice that this is precisely the position where, in actual warfare, an enemy who intended to remain stationary would place himself.

The fifth condition introduces a case which is no doubt rare, but curious. Supposing a target placed on the crest of a hill, and that the ground seems to slope from you right up to the target, evidently, if a shot is fired and you do not see the shell burst, you will conclude that the shell went right over the hill. But now it may happen that there actually intervenes between you and the target a deep but cunningly concealed depression, and that your shell fell and burst in there, being therefore short instead of over.

Instances of these features exist on the Dartmoor ranges in addition to the other difficulties I have noted before, and it is the universal experience that the obstacles to an effective fire, are first and chiefly the difficulties, I might say the impossibilities, of observation.

In view of these difficulties it is perhaps curious that there is nothing laid down as to whom the duty of observing devolves on. Some commanding officers observe for themselves, some assist themselves with an independent observer, and some rely entirely upon him. In favor of the independent observer it is urged that he is always at his post, indifferent to all else, except his one simple duty of shouting either "Over" or "Under;" whereas the commanding officer is distracted by numerous other duties, which are: 1st, the arithmetical problem of halving each successive bracket and writing it down, together with the result of the shot, so that, in case things get mixed, he will have data to refer to; 2d, the duty of looking to see when each gun is ready to fire and giving the signal; 3d, the necessity of looking up the fuse table, so as to be ready with the order for the proper length of time-fuse as soon as it is possible to open with shrapnel.

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These arguments rest on an assumption, a fallacy, and an extravagance.

The assumption is that an observer is always at hand, and takes no account of the long chapter of accidents which may temporarily or permanently cause him to absent himself. Whereas the commanding officer really has the advantage of being always present.

The fallacy is in supposing that observation is so simple a matter; whereas it nearly always demands a great alertness of the faculties and often an exercise of judgment.

The extravagance is in the piling up of the other unnecessary duties on the commanding officer. Whereas, 1st, the arithmetical puzzle is much simplified by the invariable use of a bracket based on either 64 minutes or 640 yards; 2d, the record can be kept for him by a man standing at his elbow, who can also watch the guns and be the instrument for giving the firing signal; 3d, the setting of the first time-fuse, being rigidly determined by reference to a printed scale, can be performed with perfect proficiency by the subaltern in command of the section which first loads with shrapnel.

In favor of the commanding officer being his own observer, it is urged that his rank requires him to perform responsible duties rather than mechanical details.

The method and difficulties of determining range being now explained, it is worth while inquiring what is the range which has been so determined. Is it the actual distance from the gun to the target? The answer is, that it may be so, but is not necessarily, nor even generally so. In fact, that which is obtained is the gun elevation necessary to throw a shell so as to hit a certain object, and it is a pity that the word "range" is used at all, as it allows untrue notions to creep in. It has occurred in this way: In old days you found experimentally the amount of elevation necessary for the shot to travel a direct distance of, say 500 yards. You then marked the sight, and wrote "500 yards" over the mark. On all subsequent occasions when you put your sight up to the 500 yards' mark, aimed and fired your gun, you expected the shot to travel 500 yards. And so, for all practical purposes, it did. But with modern guns, this is far from being the case. As I said before, when treating of the increased difficulties of accurate firing, any slight cause, such as dampness of atmosphere, height above sea-level, direction of wind, wear and tear of gun or sights, or sight brackets, age of powder, etc., make the shooting of guns vary considerably on different occasions, and thus evidently render them untrue to a rigid yard scale based on actual measurement. As a matter of principle, yards should not be marked on sights, but only degrees and minutes; as a matter of fact, range is never obtained, but the angle of elevation requisite for the particular occasion. This has, of late, been recognized, and the inevitable compromise has been introduced of calling the elevation gun-range to distinguish it from the actual yard-range.

Technical as this matter is, its interest will become very apparent presently, for now that we have realized the great difficulties, we are in a position to consider the interesting question of their solution.

Here we are met by two opposite schools. One, the retrogressive one, which would have us revert to a simple and less powerful weapon or per-

haps to a howitzer type of gun. In the latter direction, perhaps, something is even now being done, but we cannot here enter into a discussion of that. The other school says: "Keep your guns, but allow me to introduce to you this little instrument."

The little instrument certainly deserves particular notice. It used to be known as a range-finder, but in its improved shape it is known as a telemeter. It is a combination of telescope, reflecting mirrors, adjusting levers, scales and drums, and requires for its manipulation the services of two intelligent men. It is claimed that you can take ranges so accurately and surely with it, that you can put the required elevation on your guns, set your time-fuses, load the guns behind any convenient cover, and then, without any preliminary ranging, run the guns up and overwhelm the enemy with a rapid shrapnel fire.

This is a very interesting proposition, and high hopes have been built on it; but let us examine it a little more narrowly.

It takes the services of two men, who are therefore practically lost to the battery.

It requires a clear field for its use, and thus may be an impediment to other troops.

It may give intelligence to the enemy as to the position you are going to occupy.

It may be out of adjustment, and thus give a wrong range.

The men using it may mistake the object and thus give a wrong range.

Finally, the men using it may make errors in manipulation, which again will give a wrong range.

All these objections are admitted. They require weighing.

The first three we will pass over. The other three concern errors in range. These errors may be either gross or slight. In a batch of ranges taken with double observation at Okehampton, I find that gross errors, *i. e.*, exceeding 10 per cent. of the range, occurred once in eight times. Presumably they would occur more often if single observations only were taken, and certainly they would occur far oftener in actual warfare. We might assume then that 25 per cent. of ranges would be grossly wrong, and the use of the instrument in these cases so far from being an advantage, would be a source of waste and delay. A far more serious evil, however, will be occasioned when the error in range is a very slight one. For, on account of reasons which I have already twice stated, our modern accurate gun requires corresponding accuracy all round. Now, if the telemeter gives a large error, you will notice it, and therefore range your guns correctly by the ranging process; but if it gives a small one, which will be difficult to notice, you may then perhaps go on shooting all day without obtaining the slightest effect.

How often does the telemeter give a slight error? The answer is that it is only by chance that it gives a correct range. For the telemeter measures the range in yards, and as we have already seen yard range is not gun range, and it is gun range that we want.

The telemeter is therefore no substitute for the ranging process.

It claims, however, to be a useful adjunct, and, as such, receives

a more tolerant approval. Critically examined, however, the claim is illusory.

Its average error, taken from a long course of trials, is undoubtedly a small one. Now, the time it takes to range depends on the number of shots you fire, which depends on the length of the first bracket. It is argued that with the telemeter you need only use a very small bracket, thus saving two, or even three, shots.

We have here in its nakedness the pedagogic error of applying the doctrine of averages to military matters. Nothing is more delusive or more fraught with peril. War is too prompt and terrible to conform itself to columns of averages. The measure of utility in a military instrument is determined *rather* by its extreme limit of error than by its average error. The absolute desideratum for rapid and effective shooting is a cast-iron system which can be so taught in the barrack square that in the field a battery will work like a machine. The mere possibility, therefore, that the telemeter will be absolutely wrong, instead of approximately right, precludes you from starting with a short bracket, and forces you to use as long a bracket as if the instrument was not in existence.

It might now be argued that, as the telemeter generally gives an approximate range, it would be desirable to start with a short bracket, and then, if necessary, link on successive short brackets. This would be a return to the now exploded system of "creeping." Let us, however, examine even this without prejudice.

We must admit that in some 75 per cent. of cases where this system was used, the range would be found to be within the first short bracket. And then would ensue a saving from this of three shells, occupying in delivery a time of a little over one minute, and saving, according to the rough estimate that I am able to form, an average of at most half a life. Personally, I consider such fractions valuable, but I can conceive that, from a military actuary's point of view, *le jeu ne vaudrait pas la chandelle*. For on what occasion would the saving be effected?

It would not be effected on those occasions when the battery is in position waiting for an enemy, as the battery would then have provided itself with accurate ranges by means of the ranging process. It would not be effected on those occasions when guns are hurried up to meet sudden emergencies, such as reinforcing a fighting line, or holding a position just gained; nor on the occasion when guns already in action are directed to change their objective; for on these occasions there is neither time nor space for the range-takers to exercise their craft. For what rare occasions then would the instrument be requisitioned?

We have arrived now at the difficulties and have found no *deus ex machinâ* to solve them for us. Nevertheless, we have magnificent troops, a splendid gun, specially selected powder and fuses, and a scientific system; and, to make assurance doubly sure, we invariably take a double observation with the telemeter, and prepare our ammunition before coming into action; and our opponents are unarmed wooden dummies. At least then we shall expect to see the scene of battle strewn, after a few minutes' fire, with wooden fragments, evidence of the impossibility of any troops standing

up long before guns, and conveying a valuable object lesson to our comrades in the infantry as to the impossibility of attacking a position until all the opposite guns are silenced. This is, indeed, what we have been led to believe to be the "modern school of artillerists." But what are the facts?

According to the statistics of the Okehampton practice a quarter of an hour elapses before an effective shrapnel fire can be established against a stationary enemy. More minutely stated, according to the statistics of sixty-six attempts by various batteries, at different ranges and targets, to obtain accurate gun and fuse range, instead of the average of four minutes allowed by the modern school, an average of fifteen minutes is found to be consumed. And in these attempts we find an average expenditure of nine and a half common shell and twelve and a half shrapnel.

The theorists are, no doubt, right that it can be done in the time they name, and it often was done within it. The process therefore continually took considerably over fifteen minutes. But let us look at it from a more practical point of view. The conditions on all these occasions were alike, that a battery was held to be in a position to proceed with a rapid shrapnel fire as soon as it had fired three consecutive effective shrapnel. The commanding officer, as soon as he thought he had fulfilled the conditions, was allowed to ask the question, and the answer was signalled from the staff officer's observing party on the flanks of the target, and, if in the negative, the commanding officer had to set to work again. How many times the question was answered in the negative I am not in a position to state, but it would be considerably within the mark to state that it occurred on twenty-five per cent. of the occasion. Taking, however, five minutes as a basis of calculation, that is one minute more than is allowed by the modern school for ranging, and then, seeing that three times five minutes were expended, we should conclude that only once out of three times was a range effectively obtained, or, in other words, that the answer was a negative one on sixty-six per cent. of the occasions.

It would be interesting to see how closely the official figures agree with this calculation. There would then also be other features to take into account. First, some would say, that the limit for an effective shrapnel was on these occasions too narrowly defined. Taking into account, however, the action of our shrapnel, and the great accuracy of our fuses, and the fact that the definition was made by authorities at the school of gunnery, I am disinclined to think that there is much in the objection. A more effective objection is provided by those conditions of the ground which we have dwelt on before. Here, however, we must be careful not to make too large an allowance; for a large proportion of the targets were placed on ground which presented no difficulties to observation, and on which no enemy would ever have thought of posting himself.

We can push further than this. According to the afore-mentioned conditions, at least three of these shrapnel were really effective. But as a matter of fact, as these three had to be consecutive, there were numerous other non-consecutive but effective ones. We might estimate that at least six were effective, and this would give us three lines as the result of each effective shrapnel. This result is, however, considerably modified by a

large group fired by a single battery at a precisely similar target. Here six common and fifty shrapnel were fired, with a result of one hundred and twenty-four hits on forty-four men. The shooting was admittedly good, but if we allow six shrapnel for ranging, leaving forty-four effective, we find that each shrapnel accounted only for one enemy, by no possibility for three, but possibly for two if the enemy's firing line was being continually reinforced. It remains to be observed, however, that neither of these targets was selected by infantry officers, and perhaps some will say that the dummies were far more exposed than actual infantry would have been.

On the other hand, the powder used in the guns was of one specially selected brand. The targets were stationary, and the ground well known. Further a double observation occupying six minutes was almost invariably taken by the telemeter, and those six minutes were utilized in preparing and arranging ammunition and sights. Lastly, and most important of all, the dummies were on no occasion armed; yet the ranges against infantry targets were within the limits of modern rifle fire, and against dummy artillery within the limits of any modern guns.

It is needless to attempt a guess at how often in action guns would range successfully and open a withering fire of shrapnel; but evidently our comrades of the infantry may take heart from the above facts of peace practice. And if, from a study of them and of some about to follow, they even come to the conclusion that the artillery is really only the "bogey man," I shall consider that this article has not been written in vain.

We come now to the question of effect, for of course these twelve or thirteen shrapnel per range were not wholly innocent of life. To give an average effect for the whole of the sixty-six ranges is impossible, owing to the varying nature of the targets. We find, however, a set of nine attempts at the same target which gives some very useful figures. The target consisted of fifty half-dummies, *i. e.*, infantry kneeling, behind a sheltered trench, with intervals of about two feet between each. The average times and number of shell expended here agree very closely with the general averages given above, and the range was about 2000 yards. We find that here on an average seventeen men received twenty-seven bullets between them; or, taking twelve and a half shrapnel, as the average expended, then each shrapnel accounted for one and a quarter men; or, again, at such a target a battery while ranging destroys about a man a minute.

We will now take a set of twelve attempts made under slightly different conditions. The orders were to find the range and pour in a shrapnel fire for a total time of about ten minutes. Thus not even the average ranging time was allowed, and it is needless to say, therefore, that it was not always obtained. In fact, pedantically speaking, and judging from a comparison of the results, it was obtained in at most three instances. Yet the target was a huge one. It consisted of four companies, each of twenty or twenty-five full-length dummies in column of companies, *i. e.*, about twenty paces in rear of each other, on a gentle declivity facing the battery, and represented, doubtless, a column of infantry crossing an open space. The range was nearly 3000 yards, and the carnage was terrible. Each battery fired for an average time of nine and two-thirds minutes, expended

seven common and thirteen shrapnel, and put an average of 113 bullets into forty-two men: and as no doubt a number of them were killed twice over, we might without exaggeration, put the number of men killed by each shrapnel at four, and the number of those killed by each effective shrapnel at considerably more. The conclusion is inevitable that the upright dummy who chooses to walk down a hill towards a battery is a fool; and, bloodthirsty though we be, it is impossible to feel anything but regret for these devoted though soulless "Casabiancas" and the good ammunition expended on them. Such targets as these, resonant though they be of effect, do not enter into a serious consideration of artillery fire, for in actual warfare you would never meet with them. Their only value lies in helping to built up a general estimate that against a standing firing line of infantry the average value of each effective shrapnel is about four lines, and against a kneeling line about two, which is a meagre result when we consider the number of men, viz.: about 200, when we add in the ammunition train, the number of horses and the amount of material in a battery, when we further consider that a battery has no power for actual offense, and, finally when we consider that at peace practice even an effective fire is only developed once in three tries. Of course there is much more to be said on this subject than is contained within the limits of this slight sketch. There is, in fact, the whole reverse of the medal, viz., infantry fire effect to be gauged and valued, and then there would remain the great question of respective moral effects, especially with reference to the new smokeless powder. What I have written has been, therefore, with no intention of decrying the efforts which have been made to develop artillery fire, but with the idea that there exists at present a predisposition to imbue our fighting line with a respect for the fire of artillery quite beyond its merits, a respect which in the end will prove most unwholesome and disastrous. At least, however, I have indicated a way of dealing with the figures of peace practice which, more fully developed and with the help of complete statistics, may give us accurate knowledge in place of the vague generalities which are now floating about us.

THE DECISIVE DAYS BEFORE LEIPSIC.

By CAPTAIN WALTER v. BREMEN.

NEBENETAT, PRUSSIAN GENERAL STAFF, INSTRUCTOR AT THE WAR ACADEMY.

Translated by Lieut. ALFRED S. FROST, 25th Infantry.

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NAPOLEON'S campaign against the allies in the year 1813, from the expiration of the armistice until the battle of Leipsic, is deservedly a favorite subject of military study. This campaign, as do but few others, affords situations in abundance that will always be a source of suggestion to the thinking soldier. Although, before the publication of Napoleon's correspondence, our judgment regarding many incidents rested upon an insecure foundation, since its appearance we are enabled to command a clear view of the causes and the policy which influenced the Em-

peror in his actions. One point, which gave rise to considerable criticism, was his behavior during the decisive days immediately preceding Leipsic. An examination of these days and especially of the conduct of Napoleon will be the subject of my discourse to-day.

With 350,000 men who were distributed in Saxony, Silesia and Lusatia,* Napoleon, on the 17th of August, reopened the campaign. Opposed to him were the allies amounting to 430,000 men in Bohemia, Silesia and Brandenburg, on the periphery of the half circle in the centre of which Napoleon's forces had taken position.

This position, as well as the numerical superiority of the allies, had led Napoleon to make the undoubtedly correct choice of the strategic-defensive. Supported by the fortresses of the Elbe at Dresden, Torgau, Wittenberg and Magdeburg, which remained within his grasp and assured him a safe passage over the stream, he determined to hold his forces together and seek to strike his enemy singly and with superior strength whenever possible.

Already in July, at Trachenberg in Silesia, the allies had agreed upon their plan of campaign. This so-called "Trachenberg Plan of Operations" had in view, generally, the concentric-strategic attack upon Napoleon's forces; and this design finds its most precise expression in the closing words of the plan, which are as follows:

"The combined armies of the allies will advance to the attack and the enemy's position will be their place of assembly."

It is a pity that this beautiful thought was so poorly executed.

It serves to show how difficult it is to move separate forces upon one point according to a common plan; especially where these separate forces belong to different nations.

Only to the Prussian general, who was really actuated by an aggressive spirit, was it given to win victories upon the Katzbach, at Grossbeeren, at Kulm, and at Dennewitz. The grand Bohemian army, on the other hand, upon advancing to Dresden was completely shattered. Here, once again, the genius of Napoleon shone forth in the clearest light, as with 130,000 men he struck the army of Schwarzenberg and threw it back into Bohemia.

But among his adversaries there was one leader who had determined to make an end of the hesitating policy of the Bohemian army as well as that under the Crown Prince of Sweden; this was none other than General Blücher. In the middle of September this general boldly decided to move out of Lusatia towards the Elbe, to cross this stream in the neighborhood of Wittenberg, and to advance by Halle straight upon Napoleon's communications.

This undertaking, which necessitated the complete transfer of the communication of the Silesian army, must ever be regarded as most daring. Just as in the year 1814, Blücher was again enabled, by detaching himself from the Grand Army, and by his march to the right over the Marne and the Aisne and his subsequent advance upon Paris, to bring the campaign of 1814 to a fortunate conclusion; so this march to the Elbe was the turning point of the impending decision.

On the 3d of October, the Silesian army, under extraordinarily difficult

* Not counting Davoust, who with 30,000 men was on the lower Elbe.

local conditions, in a glorious action at Wartenberg forced the passage of the Elbe in the face of a strongly posted enemy.

Napoleon did not perceive this movement in time. While the approach of the Silesian army to the Elbe did not escape his notice, yet as late as the 2d of October he was of opinion that it was his adversary's intention to attack the fortified camp at Dresden from the north.*

He had not credited such a bold enterprise as Blücher's to even the most enterprising and dangerous general of his enemies. He contented himself therefore, on the 2d of October, with placing the fortifications of Dresden on the right bank of the Elbe in a condition to repulse the attacks from the side of the Silesian army which he expected about the 4th or 5th.†

On the night of the 3d, Napoleon received news that his opponent was making preparations to effect a passage at Mühlberg, about fourteen miles above Torgau. He immediately despatched his adjutant, General Lebrun, to Strehla with orders to collect the troops there and at Riesa, and oppose the enemy's passage under all circumstances.‡ But at this very moment 24,000 men of the Silesian army were already upon the left bank of the Elbe, at Wartenburg; and Blücher's object in sending Sachen's corps on Mühlberg, to mislead Napoleon as to his real point of passage, was completely accomplished.

Napoleon first learned of this passage in the night of the 4th.

The positions of the French forces, which are shown upon Map I., were as follows:§

The main body, composed of the Guard, the 11th, 1st, and 14th Corps and the 2d Cavalry Corps, total 90,000 men, in and about Dresden, where the Emperor had established his headquarters; somewhat further down the stream on the left bank of the Elbe, from Meissen to Strehla, was the 3d Corps, about 20,000 men.

A second body, the 4th and 7th Corps, both under Ney, and the 6th Corps and a Cavalry Corps under Marmont, total 60,000 men, was posted along the left bank of the Mulde from Eilenburg to Bitterfeld.

A third body, the 2d, 5th and 8th Corps and the 5th Cavalry Corps, total 43,000 men,‖ under Murat, the King of Naples, with its front towards the Erzgebirge in the line Altenburg—Freiberg.

* On this day Napoleon wrote to Macdonald: "Il parait que les corps de Langeron, de Sacken et de Blücher ont fait tous un mouvement sur Elsterwerda et Grossenhain. Il est possible que ce soit pour attaquer le camp retranché du côté de la plaine, par les chemins de Berlin et de Meissen. Comme ils évitent par là la forêt, c'est effectivment le point le plus attaquable." Corresp. XXVI., 20,678. Upon the same day he expressed himself similarly in a letter to Gouvion St. Cyr.

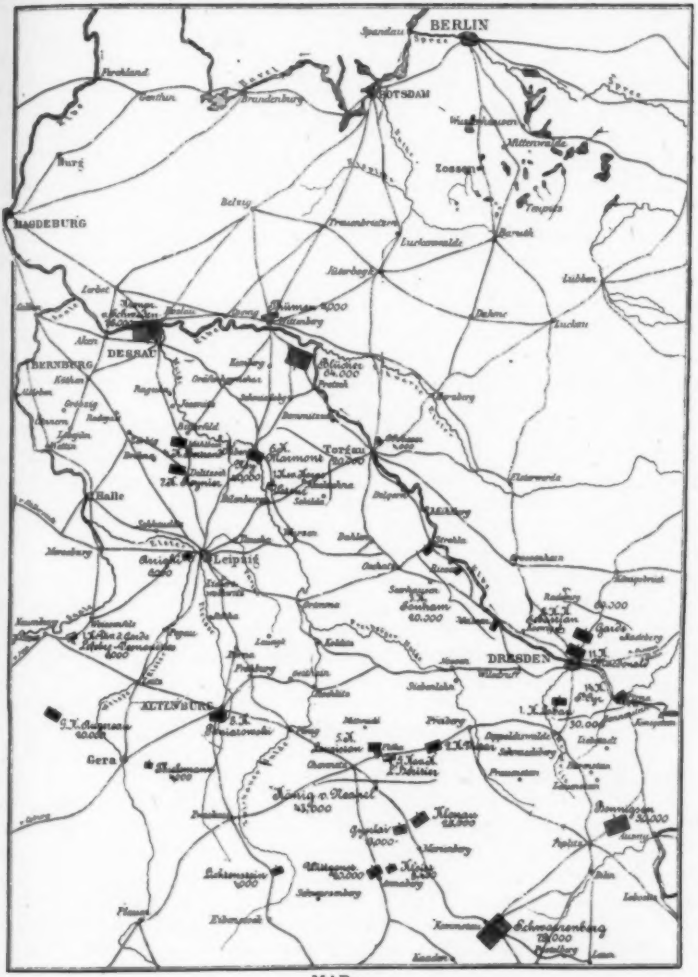
† On the 2d of October, Napoleon wrote to the chief of engineers, General Rogniat: "Il faut s'occuper avec la plus grande activité du camp retranché de la rive droite," and to the chief of artillery, General Count Sorbier: "Il faut tout préparer comme si l'on devait être attaqué le 4 ou le 5." Corresp. XXVI. 20,681 and 20,682. In orders which went into details he acquainted both generals with the proposed fortifications.

‡ The orders in question were given by Napoleon at 4 o'clock in the morning of the 4th of October. Corresp. XXVI. 20,690, and 20,691.

§ Consult Map I. The disposition of the French forces on the 4th as given by York in his work "Napoleon as General," is not quite correct. He took the same from the *Précis militaire de la campagne de* 1813, which he also follows in his reflections.

‖ Plotho reckons 43,000; Schulz, History of European Wars, 42,550. In Norvin's Portefeuille de 1813, II. 366, Murat's troops together with the 1st and 14th Corps, are placed at 70,000; the last number 30,000, so there remained to Murat 40,000. We can therefore consider 43,000 as correct.

Finally a mixed corps of about 6000 men under Arrighi, occupied Leipsic; and between Weissenfels and Naumberg there moved a cavalry division of the Guard, about 6000 horses, under Lefèbre-Desnouettes.


BERLIN
POTSDAM
MAGDEBURG
DESSAU
BERNBURG
Halle
Leipzig
DRESDEN
ALTENBURG
Gera
Torgau
Wittenberg
Luckau
Luckenwalde
Jüterbog
Dahme
Lübben
Baruth
Treuenbrietzen
Belzig
Brandenburg
Ziesar
Burg
Loburg
Köthen
Zörbig
Bitterfeld
Delitzsch
Eilenburg
Lützen
Weissenfels
Merseburg
Naumburg
Zeitz
Borna
Penig
Rochlitz
Colditz
Grimma
Oschatz
Torgau
Herzberg
Elsterwerda
Hoyerswerda
Bautzen
Görlitz
Lauban
Sprottau
Sagan
Luckau
Lübben
Königs Wusterhausen
Trebbin
Zossen
Mittenwalde
Teupitz
Baruth
Luckenwalde
Jüterbog
Treuenbrietzen
Belzig
Brandenburg
Ziesar
Burg
Loburg
Dahme
Luckau
Lübben
Spandau
Potsdam
Werder
Ketzin
Nauen
Rathenow
Genthin
Parchim
Schwerin
Ludwigslust
Wittenberge
Perleberg
Pritzwalk
Neuruppin
Fürstenberg
Templin
Prenzlau
Angermünde
Eberswalde
Bernau
Strausberg
Müncheberg
Seelow
Frankfurt
Fürstenwalde
Beeskow
Storkow
Königs Wusterhausen

fortresses of Torgau, Wittenberg and Magdeburg were so strongly held and in such good condition, that they had no cause to fear a siege. As the distance from the extreme left at Bitterfeld to the extreme right at Pirna was about 85 miles, the forces (excepting Augereau) could be concentrated upon either flank in from six to seven days, and upon the centre in about half that time.

Opposed to this unusually crowded position were the armies of the allies, distributed as follows:

In the north the army of the Crown Prince of Sweden, 76,000 men, was at Aken and Dessau, and for most part upon the left bank of the Elbe; the Silesian army under Blücher, 64,000 men, on the left bank of the Elbe at Kemberg. The fortresses of Wittenberg and Torgau were observed by small detachments.* After the flank march of the Silesian army out of Lusatia, only weak detachments were left to oppose the French centre at Dresden.†

From the south the Bohemian or Main Army under Schwarzenberg, was about to advance over the Erzgebirge. Here, at the end of September, the arrival of the Russian reserves under Bennigsen in the vicinity of Teplitz, gave the signal for a renewal of hostilities. They no longer planned, as in the first instance, to move upon Dresden, but upon Leipsic; and with this direction so perilous to Napoleon, to strike in his rear. North of the mountains to the southeast of Chemnitz, near Zschopau, was the right wing, composed of the corps of Klenan and Gyulai, together numbering about 38,000 men; at Schwarzenberg was the corps of Wittgenstein, 20,000 men. Strong cavalry detachments had already pushed on to the neighborhood of Gera and Altenburg.‡ Thus there were now 70,000 men north of the mountains while the remainder was still southward of the same, near Klommotau. Covering the right flank of the main body, was the Russian reserve under Benningsen, 50,000 men, near Teplitz and Aussig.

A glance at Map I. will show how critical the Emperor's position had become. He was now turned on both flanks and across his rear enterprising partisan leaders of the Northern and the Main Army clasped hands and threatened his communications to the utmost.

At the opening of the campaign, Napoleon said confidently: "One cannot turn 400,000 men supported by a system of strongholds and a river like the Elbe; who can with equal ease debouch by Dresden, Torgau; Wittenberg or Magdeburg."§ But these 400,000 men had been reduced to 240,000, and of the fortresses neither Magdeburg nor Wittenberg had prevented the passage of the river by the Northern and Silesian armies. Dresden and Torgau, on the other hand, had thus far lost their significance; for here, on the right bank of the Elbe, strong bodies of the enemy were no longer to be found. The Emperor possessed only one great and important advantage over the allies and that was—unity of command.

* Wittenberg by the Prussian Brigade Thümen; Torgau by the Prussian Brigade Wobeser.

† At Bautzen a Russian detachment under Tscherbatow, about 8000 men; and at Neustadt, on the Bohemian frontier, an Austrian detachment about 5000 strong.

‡ Already on the 28th of September, Thielman had driven the cavalry division Lefèbre-Desnouettes out of Altenburg, with severe loss.

§ To Marshal St. Cyr, 17. Aug. 1813. Corresp, XXVI, 20,398.

In the south the allies were commanded by Schwarzenberg and the three monarchs; in the North by the Crown Prince of Sweden and Blücher. Although, strictly speaking, Schwarzenberg exercised supreme command over the allied forces, yet the distance separating the different armies precluded co-operation or unity of action. From this it followed that each commander viewed himself as more or less independent.

This distance alone made itself powerfully felt. For example, information of the victory of Wartenberg, on the 3d of October, did not reach Schwarzenberg until the 7th.*

And here the question arises: Was it possible for Napoleon, in his present situation, to attack the armies approaching from the north and the south separately and with a superiority? There lay before him two alternatives; either to turn against Schwarzenberg or against the Northern and Silesian armes.

It was, evidently, easier for him to assemble his forces against the first than against the last. If Napoleon withdrew all available strength from Dresden, within two days he could assemble 130,000 men near Chemnitz. Two days later Prince Schwarzenberg had passed 25,000 more men over the mountains,† so that Napoleon would have opposed him with a superiority of 30,000 men. He would therefore have had well-grounded reasons for expecting success; and such success, apparently, would have left him undisturbed on this side for a long time. Owing to the hesitating and cautious conduct of Schwarzenberg this could be undertaken with tolerable safety—for since the battle of Dresden a full month had passed before the Field-Marshal could bring himself to authorize a forward movement.

If Napoleon turned against the Northern and Silesian armies he could employ the Dresden troops, leaving those occupying the line Altenburg-Freiberg to contain the Bohemian army. He could, within three days, assemble 160,000 men in the neighborhood of Düben and thus oppose the Northern and Silesian armies with a superiority of 20,000 men. Together with Augereau's command the troops opposed to the Bohemian army were then about 60,000 men. Therefore Napoleon could look upon this number as sufficient to contain the Bohemian army until a decision was reached in the north.

In either case Napoleon had an opportunity to attack an isolated enemy with superior strength and to obtain a favorable result.

If Napoleon hesitated to attack either one of these bodies of the allies, there remained another course, which was to assemble his forces near Leipsic and there, in a well prepared position, to await the attack. This, however, left him exposed to the danger that out of the strategical turning movement already under way there would also come a tactical one upon the battle-field. Should this happen it could be easily foreseen that the great numerical superiority of the enemy would lead to his capitulation.

* Barclay's Journal of the Operations of War. Schwarzenberg's headquarters were this day at Marienberg and the news could only reach him after a long detour to the west of Leipsic; so it is not surprising that it came so late.

† These were the 2d Austrian Corps and the reserve of the Prince of Hessen-Homburg. The entire Bohemian army had crossed the Erzgebirge on the 8th of October; but Bennigsen's troops made reconnaissances the first days and the main body did not begin to cross until the 7th.

Finally the Emperor had still another course, namely, to wholly give up his position in Saxony and fall back behind the Saale. In six days the troops farthest advanced beyond Dresden could have reached the Saale; those in the north at Düben and Bitterfeld, and in the south on the line Altenburg-Freiberg could follow the movement according to the pressure of the enemy. These movements could still have been executed at this time without special danger.*

In order to judge correctly of the measure actually adopted by Napoleon we must first consider how far the screened position of the enemy was known to him.

At the first news of the movements of Blücher and his passage at Wartenburg, Napoleon did not grasp their true significance. True, he did send Marmont, from whom he received this news, an order to retake from the enemy the bridges of Wartenburg, Rosslau and Aken,† but he had no suspicion that the whole Silesian army was already upon the left bank.‡ He contented himself therefore with sending the 3d Corps on Torgau and placing it under the orders of Marmont. Ney should then with the combined forces on the Mulde, 80,000 strong, have thrown the Silesian army back over the Elbe. It must be acknowledged that Napoleon suffered from the faulty execution of his subordinates. It was Ney in particular who under no especial pressure abandoned his position on the left bank of the Mulde, and by his movement to the rear drew Marmont with him.§ Indeed it is quite possible that an energetic advance of the forces here assembled would have driven Blücher back over the Elbe by the weight of numbers. The Crown Prince of Sweden would have scarcely felt inclined to afford Blücher timely and powerful aid as he was ready to retreat at every approach of strong French forces.

Again, neither the extent nor the object of the movements of the Bohemian army had been comprehended by the Emperor. As the reports brought in in the first days of October caused him to return to his opinion of the last of September,‖ that the allies now hesitated to assume the

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*On the 10th of October Napoleon was able to assemble his forces behind the Saale. The King of Naples really withstood the pressure of the Main Army until the 12th. An advance of the Northern and Silesian armies could also have been delayed until this day by the forces of Ney and Marmont.

†Reunissez votre corps, le 1er corps de cavalerie, et marchez à l'ennemi. Enlevez-lui ses ponts de Wartenburg, Dessau et Acken, qu' il ne lui reste aucun. Communiquez ces nouvelles au prince de la Moskowa, et faites-lui connaitre combien c'est important d'enlever à l' ennemi tous ses ponts. Corresp. XXVI, 20 694.

‡Else he would not have written to Marmont at 3 o'clock in the morning of the 5th of October: "Il serait urgent de rejeter l'ennemi au delá de la riviere avant qu'il ait de nouveaux renforts." Corresp. 20,695.

§The charges against Ney made by Marmont in his memoirs must be regarded as well founded. Marmont here showed truer insight and greater ability than the otherwise fearless and unshrinking Ney.

‖On the 1st of October the Emperor wrote to Berthier: "Faites connaitre au Maréchal Saint-Cyr que tout porte à penser que l'ennemi opère sur sa gauche," and to the Marshal Victor, who with 2d corps was at Flöha: "Comme tous les renseignements que je reçois de tous côtes portent que l'ennemi fait effectivement quelque chose sur sa gauche." Correspondence. XXVI, 20,670 and 20,671. He even pointed out in these days that if the allies advanced by Marienberg on Leipsic or Dresden it would be very favorable to him as then at length they would come to battle.

offensive, and therefore, would content themselves with minor warfare,* he did not apprehend a serious advance of the enemy on that side.† He therefore determined to advance against the Northern and Silesian armies; meanwhile on the 5th of October, he conducted a further movement of the troops assembled at Dresden down the Elbe. A part of the Guard was sent toward Meissen, and Marshal Saint-Cyr, who was south of Dresden with the 1st and 14th Corps, drew nearer to that city. In the night of the 6th of October the Emperor received assurances that the Silesian army had directed itself upon Wittenberg.

Now further troops were put in motion. Macdonald with the 11th corps, Sebastiani with the 2d Cavalry Corps, who were still upon the right bank of the Elbe, were ordered to fall back upon the river and cross at Meissen. Sebastiani was then to push on as far as the junction of the two roads running from Torgau and Leipsic to Meissen. Napoleon's leading thought in this measure was to keep open not only the road to the Mulde but still another; for closely connected with the design to move upon the Mulde arose another plan, namely, to march upon Torgau and there, under cover of the fortress, to cross the Elbe and advance upon the right bank. Napoleon thought to completely sever the communications of the Silesian army and seize the bridges at Wartenburg without being forced to advance against the front of the enemy or against the fortifications constructed for the defense of the bridges. The possession of the fortress Wittenberg made it tolerably certain that he could recross to the left bank. In the morning of October 6th, Napoleon imparted this plan to Marmont and at the same time his intention to enter Meissen that evening in person.‡

The boldness of this plan makes it undoubtedly alluring at first sight. Without regard to his own communications, already threatened by the progress of the allies upon the north and south, the Emperor decided to fall upon the rear of his most dangerous enemy, Blücher.

But one must further inquire whether the direction chosen by the Emperor really promised success provided Blücher did not allow himself to be misled but continued his movement on Leipsic, which could hardly be prevented by the weak French forces opposed to him. If meanwhile, the Bohemian army also advanced, the French forces upon the left bank of the Elbe would be easily crushed. Napoleon then would be striking at the empty air; for a continuation of the movement in the direction of Berlin

* On the 29th of September the Emperor wrote to Berthier: "Ecrivez au Maréchal Saint-Cyr qui 'il paraît que l'ennemi a renoncé définitivement à son project de pénétrer sur Dresde et à toute opération offensive, se contentant de faire la petite guerre." Corresp. XXVI, 20,659.

† "Je ne crois pas que l'armée de Wittgenstein arrive avec ses renforts. Je crois que le corps de Klenan est fort de 14,000 hommes d'infanterie," wrote Napoleon on the 5th of October to the King of Naples. Corresp. XXVI, 20,698.

‡ This document was issued at about 9 o'clock in the morning and reads as follows: "Je me propose de me porter sur Torgau, et de là de marcher par la rive droite, afin de couper l'ennemi et de lui enlever tous ses ponts, sans être obligé de lutter contre ses têtes de pont. En marchant par la rive gauche, il y a l'inconvenient que l'ennemi peut repasser la rivière et éviter la bataille; mais, dans cette seconde hypothèse, on pouvait déboucher par Wittenburg." Corresp. XXVI, 20,705. In the same writing there appears: "Je serai ce soir à Meissen avec 80,000 hommes." In a letter to Sebastiani of the same day he expresses himself: "Je serai de bonne heure ce soir, de ma personne, à Meissen." Corresp. XXVI, 20,707.

was not to be thought of in view of his comparative weakness, and the fact that the enemy was posted in his rear. The Emperor would then be completely cut off from his communications with France; his adversaries would be united in his rear, and his position would be the most unfavorable imaginable. Thus, this audacious plan loses its value upon a closer view. Napoleon appears to have felt this himself, for, although he communicated this plan as stated above, still he added: "At all events, as the enemy has seized upon the initiative, I will be able to shape my course when I fully understand the condition of things, namely, on the evening of the 6th."

Indeed, upon the evening of the 6th, the Emperor abandoned the plan of taking the offensive upon the right bank of the Elbe, and decided to move the troops remaining at Dresden and Meissen upon Wurzen; and, in order to check any attempted advance of the Bohemian army, to combine the troops in the line Altenburg-Freiberg under the command of the King of Naples at Rochlitz. He finally chose the plan, the feasibility of which we formerly pointed out, namely, to contain the Bohemian army with a part of his force and to concentrate the main body, about 170,000 men, on the middle Mulde in order to operate against the enemy advancing from the north. But the plan of attacking regardless of circumstances was not clearly and definitely settled upon; for Napoleon himself said: "From Wurzen I can move on Torgau and against the enemy, who is breaking through from Wittenberg, or unite my whole force at Leipsic for a general engagement, or fall back over the Saale."*

The Emperor had four possible plans in view, which were: To advance upon Torgau; which would lead to the original plan of an offensive movement on the right bank of the Elbe.

To move straight upon Blücher. These were the two offensive thoughts. The other two were of a defensive nature.

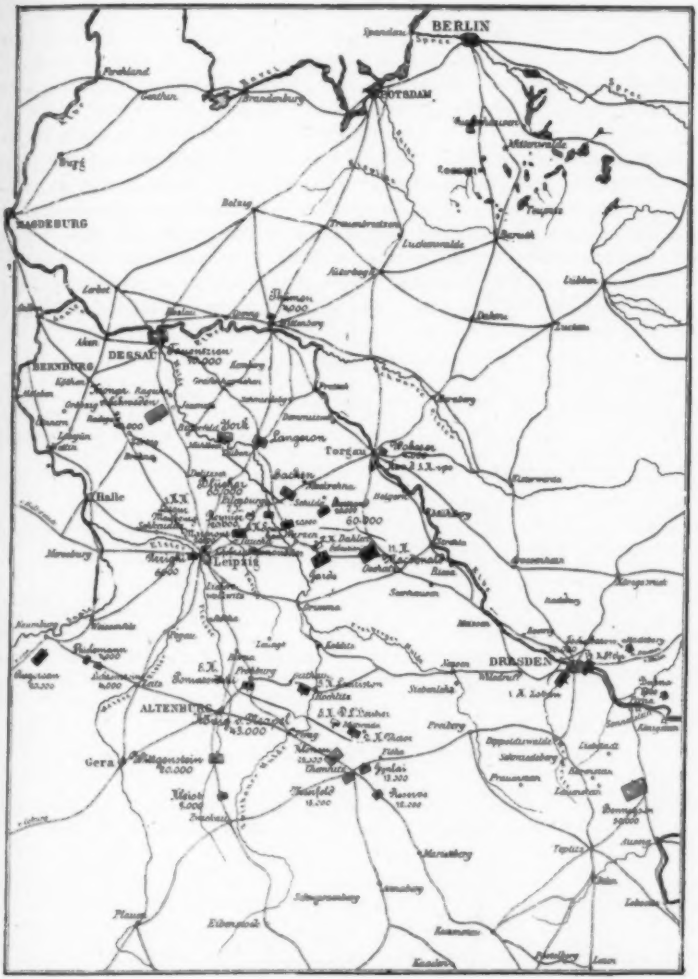
To unite all the forces at Leipsic and there await the attack. Which is the third plan suggested by us above.

To retreat behind the Saale, our fourth plan, which, in his present situation, offered the safest means for delaying the decision. The possibility of throwing his main body against the advancing Bohemian army and there to seek a decision, seems to have been overlooked by Napoleon. And yet, as has been shown, concentration could have been more speedily effected at that point and success more easily secured than by the movement against the Silesian army. In order to contain Blücher, Ney and Marmont were sufficient; as, judging from his previous behavior, an energetic advance of the Crown Prince of Sweden was not to be apprehended; but with the Bohemian army once more thrown back into Bohemia, Napoleon could turn against the force approaching from the north, and the discord prevailing between its leaders offered new chances of success.

That the Emperor did not see the possibility of first attacking the Bohemian army may have been due to the insufficient information he had at this time received regarding the movements of that army, and to his opinion that an advance of strong bodies on this side was out of the question.

*Notes sur les mouvements des différent corps d'armée. Dated Dresden, 7 October, 1813, 1 o'clock, A. M.

His determination to give up Dresden was decidedly correct; but the different alternatives weighed by the Emperor during his operations on the



MAP 2.

middle Mulde* make it certain that he had not decided to use his superiority in a rapid offensive under all circumstances.†

*The views of the Precis militaire de la campagne de 1813 en Allemagne and those of York do not entirely agree. There, among others, the Emperor's intention eventually to move from Wurzen upon Torgau and also to take up the offensive upon the right bank is omitted, and a march upon Torgau is held equivalent to an advance against Blücher. It was not so, however; for it is said expressly,

On the morning of the 7th, after a whole night of labor, the Emperor left Dresden for Meissen, taking with him that part of the guard still remaining in Dresden.

Marshal Saint-Cyr was this day ordered to assemble the 1st and 14th Corps in Dresden to send all stores as well as the sick by boat to Torgau,‡ and on the eighth (see map 2) to follow with his troops on Wurzen where the Emperor expected their arrival on the 10th.§

The concentration of 170,000 men upon the middle Mulde was therefore begun; and the greater part of the Dresden forces were marching upon Wurzen. But the plan of giving up Dresden was only of short duration. Apparently before his departure, at any rate upon his arrival at Meissen, the Emperor changed the same and decided not to give up that city unless the battle he was seeking with Blücher and the Northern Army resulted unfavorably.‖ Saint-Cyr, according to this new plan, was to occupy Dresden with the 1st and 14th Corps—altogether 30,000 men—and to give out that he was 50,000 strong.¶

(*To be continued.*)

"de Wurzen je puis me porter sur Torgau et sur l'ennemi." It is for this reason, probably, that the Precis passes over the intention to make an offensive movement upon the right bank of the Elbe, which Napoleon had already imparted to Marmont on the 6th, and therefore does not suspect a similar one in the project of the 7th.

†Writing to Marmont 7th October, 4 A. M., the Emperor said he had chosen Wurzen in advance as a rendezvous in order to be able to reach Leipsic, "si cela était absolument nécessaire." Corresp. XXVI, 20,717. Two hours later he wrote to the King of Naples: "Retenez les Autrichiens le plus que vous pourrez, pour que je puisse battre Blücher et les Suédois avant leur arrivée au corps de Schwarzenberg," and again put the offensive thought in the first place.

‡ On the 6th Napoleon gave orders to prepare to evacuate the city on the 7th: "L'administration fera embarquer 6000 malades; 30 (bateaux) seront donnés à l'artillerie, qui fera embarquer tous ses caissons, fusils et munitions. Ce convoi de 70 bateaux sera prêt à descendre la rivière dans la journée de demain pour se rendre à Torgau." Corresp. XXVI., 20,709. On the 7th of October, 3 A. M., the Emperor gave the later orders for the evacuation of Dresden. Corresp. XXVI., 20,714.

§ "Le 10, le corps du maréchal Saint-Cyr, serait sur Wurzen." Corresp. XXVI., 20711. Marshal Saint-Cyr relates in his memoirs that he was summoned by Napoleon at midnight on the 6th. The Emperor then explained his intention to make Dresden the central point of his operations no longer, but to abandon it in order to take up a new position behind the Saale with his right resting on Erfurt and his left upon Magdeburg. This arouses suspicion as it does not agree with the instruction the Emperor gave Marmont on the evening of the 6th regarding an advance upon the right bank of the Elbe, nor with the remarks concerning a retreat behind the Saale made by him at 1 A. M.on the 7th, shortly after the interview with Saint-Cyr—Corresp. XXVI., 20,711—and which we have mentioned in the last lines above. If the Emperor decided upon the evacuation of Dresden it was because he needed these troops in the impending battle.

‖ From the letter sent to the King of Naples from Dresden, 7th October, 6 A. M., we conclude that Napoleon changed his plan in Dresden instead of at Meissen as stated by York. In that letter is the sentence: "Le maréchal Saint-Cyr reste à Dresde." It is not to be understood that the Emperor only intended to leave Saint-Cyr in Dresden temporarily. There is another letter at hand which clears up this point. In the correspondence (XXVI., 20,710) there is a letter to the chief of administration, Count Dam, which, though it bears no date, appears to have been written on the morning of the 7th (and not, as remarked by the publisher, on the 6th) containing these words: "J'ai ordonné que le petit quartier général partit aujourd' hui." The lesser headquarters, however, did not break up till the 7th. To quote further from this note: "L' Empereur va livrer bataille. La place sera occupée par 30,000 hommes. Si sa Majesté perd la bataille, elle fera évacuer la place. Mais comme sa Majesté remportera la bataille, Dresde se tiendra toujours son centre d' operations."

¶ In a despatch from Meissen to Marshal Saint-Cyr, the Emperor thus explains his intentions regarding Dresden; "J'ai l' espérance d' attirer l' ennemi à une bataille. Mes idées seront entierement assises demain. et, si j'ai l' esperance d' attirer l' ennemi à une bataille, mon intention est de conserver Dresde; d' autant plus que j' operai par Torgau et que m communications seront assurées par l' une et l' autre rive." Corresp. XXVI., 20,719.

FORTIFICATION.

By MAJOR H. D'A. BRETON, R. E.

(*From Royal Engineers' Journal, February 2, 1891.*)

IN his recent trenchant work on this subject, Major Clarke has tilted against the symmetrical systems. I am not concerned to defend them, as, though they doubtless fulfilled their rôle in the conditions and war usages of their times, interest in them nowadays is purely antiquarian; but when he objects *in toto* to what he calls theoretical fortification, a more precise definition is necessary. Any form might be so styled even when constructed by the soldier as opposed to the draughtsman, the theorist, and the professor. The Twydall system advocated by him is as theoretical as any other.

Theory rests on a due collection of ideas and the tentative generalization of principles and data deduced from war experience and peace experiment. The genesis of Vauban's third system and the Twidell Redoubt is the same. Major Clarke, however, paints the theorist as one who ignores the lessons of war and peace—such a man is unworthy of the name. We are all of us theorists till our works have been tried in the crucible of war. The danger of long peace, when the fungi of habit spread over men's minds, is that the theorist drifts into the technologist, and it is this individual whom Major Clarke would seem to hold up to reprobation when treating of the subject of English forts. He introduces his work with this sentence: "No science is so delightfully empirical as fortification." Fortification, however, is not a science, but an art. This is the cause of an infinite variety of ideas on the subject, and it is its attempted reduction to a science that has resulted in the instances he deplores. Underlying the art there is, admittedly, a science, but it is one purely of dimensions.

In crystalizing theory, considerable divergence will ensue from the varying importance attached by individual minds to the several factors, and mistakes will inevitably result; but it is hardly just to brand as "theory" every scheme with which we personally disagree. The problem is, how best to satisfy many antagonistic conditions, and fairly balance mutual disadvantages. Whatever be the issue, it is tolerably certain that it will meet with the condemnation of the critics if only from their ignorance of the limitations imposed on the designer.

As he well observes, "each successful or unsuccessful attack or defense may generally be traced to any one of a dozen causes in accordance with the personal predilections of the writer." This practically sets aside all appeals to history. The accounts of sieges are indeed too meagre and unreliable for accurate deductions. An instance may seem to tell for or against a certain system of permanent fortification, whereas the issue depended in reality on the quality of the personnel and matériel on either side. The exact disposition of the defenses is a small factor compared with human nature and its circumstances.

And, indeed, interesting as the study is, the attack and defense of fortresses is mainly of academic importance to the English Engineer. It is hardly probable that we shall ever undertake the siege of a continental fortress, while as regards the defense of our own, a siege proper is out of the question. It implies a loss of sea command, and with it the loss of London, when a general capitulation would probably result. All we have to provide against from the land is an assault prepared by light howitzer and mortar bombardment.

Continental opinion is too frequently embraced and if German, accepted as gospel, without a thought of circumstantial variation. Some time ago, for instance, we heard a great deal of long range mass fire. How often would a British force find this suited to its strength and position? What may be true of a division in shooting line would not hold good for a corporal's guard. The habit of brooding over continental writers tends to induce a method of thought out of scale with the problems of British defense. It ever adds to the army of paper Napoleons, and results in such futilities as brigade depots barren of recruits, territorial regiments composed of Londoners, and forts out of proportion to our requirements. The line of thought most necessary in the present is that derived from the intelligent study of naval conditions, and such a work as Mahan's "Influence of Sea Power on History" has more value for us than Schliemannic excavations in the archæology of continental engineering.

Major Clarke lays down that "a fortified place should be, before all, a fighting position, and to the neglect of recognizing this axiom may be traced the relative failure of the performance of permanent fortification as compared with that of rough defenses rapidly created to meet special needs." But we have to remember that other considerations than the occupation of the best fighting position determine the locality of a fortress; whereas the "rough defenses" are usually constructed on ground selected for its singular adaptability to the purposes of the defense. Furthermore, the "rough defenses" have been held by armies, the permanent fortifications, as a rule, by weak and inefficient garrisons, and the wealth of historical instances adduced was hardly necessary to establish the proposition that earthworks, good or bad, could be strenously defended by determined men. At Metz 174,000 men surrendered after 67 days' blockade; at Plevna 40,000 after 142 days; but he would be a nice critic who should gauge the relative value of the works, food supply, methods of attack and defense, and stubbornness of military temper in the two cases.

The fire power of infantry is undoubtedly immense; but there must obviously be a proportion between the strength of the attack and defense. It is conceivable that a sufficient body of unarmed men could rush a post defended by magazines rifles. The English line at Sandhlwane was swamped in this way. In the Soudan we were driven to the use of the square by sheer weight of numbers, and even then some of the enemy got close up. The continental idea of defenses rests on powerful garrisons and field armies. We have always to consider the possibility of our works being held by weak detachments, aided by undisciplined auxiliaries, and to remember the conditions of army service and the shooting at Bronker's Spruit.

Regarding the great flanked ditch controversy, Major Clarke says: "The artillery of the attack would endeavor to keep the defenders from their parapet until the last moment, and during that last moment the fire of the defense was necessarily weak. Hence arose the vast ditches, the elaborate arrangements of flank defense. * * * The modern rifle has rendered all these expedients absolutely unnecessary in the future. * * * The infantry garrisons can be kept under cover until the last moment and during the final rush, which must be made without support, the deadly effect of the magazine rifle will have full scope. * * * Ditches and caponiers can play no defensive part till the last stage of a formal attack, and so soon as the besieger has established himself on the glacis and can begin mining, they are worse than useless." It is not quite clear how the infantry garrison can produce the deadly effect during the last moment, and yet the fire be necessarily weak; but on the assumption that they can withstand the preliminary light howitzer and mortar bombardment, it must be admitted that flanked ditches have advantages in case of attempted surprise, and might enable a weak garrison to resist an assault otherwise practicable. Furthermore, the absence of smoke and the accurate fire of the howitzer and mortar of the future will shorten this last moment very materially, and may, in some cases, render an obstacle defended by protected fire more desirable in the future than in the past.

And so, after many pages of this fascinating volume, we are gradually led to the work of the future, as the Egyptian neophyte of old was educated up and on through the many stages of the complicated mythology of the age, casting away each one on passing to the next, till he attained belief in a single simple ideal, so we are to finally find salvation in the "Twydall Redoubt." Having demolished the ten commandments of stone, the new Moses promulgates a single law in earth. It is a terrible descent, this *fin de siècle* Martello—for the military Engineer—from a Gothic cathedral to a Keltic rath, from a Raffaelle to a late Morland. The cup of humiliation is even embittered by hints that the greater our technical ignorance, the better and more efficacious our works. The subject is worth a little consideration. In common with all previous conceptions the Twydall type of redoubt is an attempt at finality, and has the same chance of permanence. Compared with the Plevna works it has the disadvantage of a single tier of fire. If the defense has the magazine rifle, so also has the attack. If unflanked ditches are as effective as is maintained, the long glacis parapet is an unnecessary extravagance. If the infantry parapet of the condemned Brialmont keep is liable to degradation, so also is this one. Gaps in the fence will certainly result. If delay action fuses prove efficient, the case-mate protection is too weak. For a single link in a chain of forts the flank fire is insufficient, and we must remember that it was never intended to stand alone, the clear interval, fence to fence, between it and its next neighbor being intended to be only about 400 yards. The Twydall type of redoubt has a command of from 9 feet to 11 feet, and 10 feet of cover; No. 2 Grivitza Redoubt had a command of 13 feet and about 18 feet of cover. At Lydd a section of the Twydall work 50 feet in length and 65 degrees to the line of fire, was fired at to test the case-mates. Of 54 rounds, 11 struck above and in front of

them, within a rectangle of 24 feet by 10 feet, bulging in a case-mate. True, this was a peace practice, but against this may fairly be set the great expenditure of ammunition prior to assault, and the probability of accurate fire from mortars throwing long, high capacity shell. It is not easy to render such a work invisible owing to the length of shoulder slope below the level of the glacis crest, and it would certainly show up against a wood in shade. It is difficult to dispose of the surplus *déblai*, inseparable from this form of section, if the redoubt be kept low. For an efficient sweeping of the glacis by rifle fire, the crest should be three feet above the plane of the glacis, and this necessitates a definite command, unless the slope of the glacis be unusually gentle. Notwiststanding its admirable suitability to the site for which it was designed, the application of the Twydall system must always be limited owing to its requiring a flattish plane of site and absence of rock. The addition of the wings proposed by Major Clarke would undoubtedly add to the frontal fire, but so far as continuity of the crest is concerned, there would be a wide gap between them and the redoubt. A schoolman would perhaps, place them somewhat in rear of the flanks and modify the gorge. As the flanks mount no artillery, their exposure seems of small moment, and a modification of the gorge is of slight objection, as the accuracy of modern howitzers renders the shallowness of works of less importance than heretofore.

There will be a difference of opinion regarding the relative advantages conferred by smokeless powder on attack and defense. Major Clarke considers the defense will gain, but some German writers maintain the reverse, on the ground that howitzers and mortars will not only be enabled to make better practice with more immunity, but also to support the assault till almost actual contact is assured.

It would be interesting to know the basis of his confident prediction that before long all field guns will be quick-firing. At present the probability appears remote. The proposed use of fixed ammunition has been given up after trial, and as it has been found impossible to deal with the recoil of a 6-pounder on a field mounting, the case of the 12-pounder B. L. presents some difficulties. It is true that the problem has been solved with the 3-pounder Q. F., but only at the cost of a field mounting heavier than that of the field gun!

Regarding coast defenses, it has been more than once suggested that the typical system should take the form of groups of small concealed batteries, defended by a central infantry work. The idea is as beautiful in conception as impossible of realization. The requisite conditions of ground never present themselves. Nature and the engineer have as a rule, been at cross purposes. Where they have not, the perversity of man has so sited the object for defense that the full advantages of the ground cannot be utilized. Destructive criticism and constructive theory are equally facile on paper, but the stern dominion of fact often forces the engineer into the erection of works at which, as he too well knows, a future generation of omniscient critics will smile with a sense of compassionate superiority. Besides, the scattering of individual guns—advantageous though it be—is prejudicial to artillery command; and even dispersed batteries present difficulties in the

way of infantry defense by the garrisons at our disposal. It follows that theory based on historical instances must be materially modified by the conditions of probable attack and defense. Hence each plan must be placed on its merits according to the circumstances of the case, and pure theory relegated to the libraries of historical critics.

Pictorial theory is as beautiful as the literary form. The hidden difficulties become revealed on its reduction to practice by the draughtsman on his drawing board. Elswick introduced the H. P. gun-pit by a sunny landscape, the gun rising Venus-like, from a sea of flowery mead. No hint here of concrete apron, magazine, stores, barrack, infantry defense, inclosure, obstacle, dead water, or any of the adjuncts to the gun that annoy the designer by their persistent obtrusion.

In this connection, it may be remarked, that height above sea level is not the only consideration affecting the use of H. P. guns, of at least equal importance is the arc of possible naval attack, and it would be sound to maintain that for sites of moderate height, and exposed over an arc of more than 120 degrees, the H. P. mounting is desirable. With 9.2-inch and 10-inch B. L. guns, however, the question of relative cost comes in, and this is so heavy as frequently to outweigh other considerations.

The section of emplacement crest proposed by Major Clarke is doubtless sound in theory, but in practice the blast of the B. L. gun demands a concrete apron. Various expedients to avoid this have been tried, but unsuccessfully. His three feet concrete parapet is also open to question. The graze of a heavy shell implies a lengthened trough, its burst may produce a crater five feet in depth, and its impact near such a construction would probably fill the emplacement with ruined wall, as was instanced at Alexandria. It seems advisable to provide such a thickness as will obviate this possibility.

In all these things we must guard against any attempt at finality, and be chary of theories framed upon isolated phenomena and particular instances. Because B. L. projectiles are deflected by gentle slopes, we must not hastily conclude that magazines require less protection than of yore, nor must we build too high on the behavior of a passive shell burst statically without the terminal velocity it requires. New forms of attack are always possible. Little experiment, for instance, has been carried out, with half charges, though, if affording sufficient accuracy of fire, they would be productive of greater effect against earth batteries than full ones. What practice has been made gives the 9.2 B. L. a probable rectangle at 2000 yards of 31 yards by 4.26 yards, the terminal velocity being 1045 feet. With an angle of impact of $\frac{1}{8}$, this means a target 11 feet, 6 inches high, and it is by no means certain that a shell would glance under these conditions. Finally, it cannot be admitted that the long B. L. gun with its short life and complicated mechanism is a persistent type. The evolution of artillery will inevitably continue, and one of our aims must be so to design our works that they may be susceptible of easier modification than were those of some of our predecessors.

What points have been selected for criticism are, however, but the motes in a sunbeam. It is impossible to speak too highly of Major Clarke's

work, and it is indeed an impertinence to praise it. Still, there is permissible a certain amused curiosity to see how the soldier would fare without the aid of the draughtsman, the schoolman, the theorist, and even the professor; and it may be well to warn the rising generation (having regard to the heroic, if guarded, assertion that fortification is within the reach of every educated soldier) against the inference that fortification is in any way more simple and easy than in geometric days. True, we have passed the long reign of the dividers and rule, and the short one of the compass, and have entered the beneficent domain of freehand drawing and landscape gardening; but the new style, especially with coast defenses, demands a higher standard from the votaries of the cult in education and knowledge, care and art, than did any that has passed away into the purgatory of historical criticism.

LETTERS ON INFANTRY.

By PRINCE KRAFT ZU HOHENLOHE-INGELFINGEN.

Translated by LIEUT. ODON GUROVITZ, 11th U. S. INFANTRY.

XII.

THE ADVANCE BY RUSHES, FIRE-DISCIPLINE AND AMMUNITION SUPPLY.

HAVING referred to the last stage of an attack upon a village, and the supply of ammunition in such a slight manner, I fully expected your reproaches, the more so as I did not mention an attack when infantry was not supported by artillery.

It is far from me to avoid these important considerations. I intended to devote an entire letter to them, otherwise my last letter would have been still longer. The most important part of the entire attack is to get over the last 500 metres to the outskirts of the village. The simplest way to carry out this task is to command: "Rise! Double-time, March! Hurrah!" While the officer giving these commands takes the lead at a run. If he is so fortunate as to reach the village he has performed an heroic deed, if he fails, he remains on the field paying for his heroism with his blood. That is very noble, and certainly preserves the soldier's honor. To sigh for the end of the crisis when the men have been long exposed to fire and have suffered considerable loss, is entirely in accordance with the nature of the human heart.

The men know that death is just as probable if they rise to run back, as if they face and approach the enemy. In the latter case there is the opportunity of revenge for the loss of their comrades. Experience, however, teaches that if this attempt is made at the wrong stage of an attack it not only fails of success, but leads to the destruction of the assailant. I have witnessed such occurrences again and again, for instance, the attack by the French at Sedan and the numerous attacks on Beaune la Rolande. More-

over, a charge of 500 metres so wearies the men that they arrive at the point almost exhausted, and need a few moments to recover breath before they can do effective work in the hand-to-hand fight. Therefore such an attempt is only feasible when the edge of the village seems to be entirely abandoned, and when there is hope of reaching it before the enemy returns; otherwise it is necessary to bring about this condition by the effect of fire.

What kind of fire should be used at 500 metres is a question to which many answers have been presented. There was a time when, at exercises and manœuvres, swarm-vollies were preferred, and different sights used by the various platoons or sections. In action I think the officer commanding would soon lose his voice from having already strained it, and I would therefore reserve the volley-fire until supports can be seen approaching through the street of the village or along its edge. The officer will then cause his men to cease firing by using his shrill whistle, and after attracting their attention, he will be able to give the command for volley-fire. The occasions in action which afford opportunity for such experiments are so rare, that one must be satisfied as a rule if an officer succeeds in controlling the expenditure of ammunition, and causes his orders to be obeyed. We may well be pleased with such fire-discipline. For in the heat of action it requires exceptional self-control not to return fire when one is being fired at, especially after having been firing a short time before. A soldier upon being reproved for disobeying the order to cease firing replied: "Lieutenant, that fellow over there shot at you; I had to give him one for it." But if the officers wish to observe fire-effects, and be able to see whether the enemy holding the edge of the village is giving way, they must insist upon pauses in the fire; for the smoke which hangs in front of a firing line frequently obstructs the sight entirely.

I do not approve using two or more sights at 500 metres. It diminishes the effect about one half, and is of doubtful value against the enemy inside the village. Even if employed against an enemy approaching over open ground, it is extremely difficult to carry out, although more suitable. It requires extreme measures to control the sights taken by the men, not only on account of the excitement due to heavy fire, but also to misunderstanding the commands. In case the range has been previously obtained from the artillery, then no one can seriously err in estimating a distance of 400 to 500 metres, while the edge of the village is kept under better command by using only one sight.

If the hostile fire ceases entirely or even partially, the men jump up at command of their officers and charge in. If the enemy has not retired beyond the adverse fire, but, for the moment, simply thought more of cover than of giving a good return fire, then their fire will soon open again, and the officers of the attacking force will have to order their men to lie down and re-open fire in order to complete the moral and physical destruction of the enemy. The advance by rushes (Par. 102 of the Regulations) is thus explained and is prescribed in practice because often unavoidable in the field. At one time many exercises were practised in connection with this advance by rushes. The idea that one part of the attacking force shall

lie down and fire while the other makes a rush, is good. But in peace-practice when one hears the battalion commander order: "The first company will rush;" "The third company will rush," it must be admitted that a system is practised which cannot be carried out in action, because the commander cannot ride so close to the fighting line that the latter can hear his voice, while if the men are drilled to wait for this word of command, they might wait a long time for it in actual service. The only practical way in which the battalion commander can accomplish his object, is to instruct the company leaders, before deploying, from which flank the advance by rushes is to be made; but even this cannot always be laid down beforehand.

I have seen other fancy attempts to drill at such advances. Thus the entire line would be divided into three parts, each of which, commencing with the first, rushed forward consecutively.

This arrangement, however, is opposed to the moral impulse of good soldiers, for as soon as one part of the skirmishers takes position near the enemy and commences firing, honor and comradeship require that all the others should hurry up to share possible danger and fight shoulder to shoulder with them. Furthermore, the moment when the most advanced skirmishers open fire is the best time for the others to rush forward, as the hostile rifles are then naturally aimed at the firing portion of the line.

Still more unpractical was the attempt to divide the entire line into several equal parts, to number them from one of the wings and direct the odd and even sections to advance alternately by rushes—thus forming an advance *en echiquier*. In this case the centre sections, advancing in swarms, are gradually masked to such an extent by their comrades on both sides that their field of fire is narrowed till they can do little or nothing. On this account I never permitted dividing a line into more than two parts for the purpose of instruction in advancing by rushes.

It is of the utmost importance, before ordering the first advance by rushes at from 400 to 500 metres, that the officers cause the men to raise the small sight, as the corresponding range will almost certainly be reached at the first rush, especially since at 400 metres the object is still indistinct, and men in action are apt to fire too high. From this last point the fight is sure to increase in intensity, the men become more and more excited and will be very likely to neglect to alter their sights. If the men are accustomed to shoot with the small sight, always aiming at the feet, the entire distance will be within the danger-zone, thus the remainder of the attack can be carried out with this sight. It is possible, if the skirmishers be well instructed and if the advance is well conducted, to reach the edge of the village without considerable loss. This may be due, as was the case with the Franz Regiment at Le Bourget on the 30th of October, to the enemy being deceived and confused by the change of targets, or, as at Villejouan, to the fire becoming so effective that the defenders abandoned their position on the edge of the village.

However, we must provide for a more stubborn resistance in a defense. In case this happens, as I pointed out above, the hostile fire will check any attempt at rushes, and the distance to be overcome will depend, not so

much on the will of the leaders as upon the effect of the defenders' fire, which will cause the attacking skirmishers to drop down and re-open fire. Why cannot they advance farther? Certainly not because they have all been shot down; but because their leaders are disabled. For the latter who always jump up first and run on ahead, will naturally be first exposed to all the opposing rifles. I would refer you to a former remark about the answer given by the men: "We had no officers left to tell us what to do." To substantiate this, look at the proportion of losses between officers and men in the last war. The infantry are justified in being proud of this. There was hardly a company which left for the field with more than three officers, thus giving fifty officers, including the staff, to a regiment of 3000 men. Therefore we had one officer to sixty men. If you look over the official list of losses you will find about one officer hit for every thirty men and often for every twenty men or less. The comparative loss of officers was thus at least double and often treble that of the men. It cannot be expected that a line of skirmishers who have lost their officers will rush on according to previous instructions. It will remain where it is, holding the ground and firing. The attack will thus be brought to a standstill and the rush stopped by the enemy's fire.

The only remedy then available will be to throw into the line a new force which will carry the other along with it in the rush. This new force will come, first from the direct supports, and later, from the companies of the second line, thus replacing losses.

The leading skirmish line is the one which up to the time it opens fire at about 500 metres, regulates the movements of the following battalion and continues to do so until its advance is stopped as mentioned above; then it will become the duty of the highest commander present to enter into the fight with his available force and thus cause rushes to be resumed. In this respect there is a most noticeable difference between battle and peace-practice. In the latter case the firing line is supposed to regulate its movements by those of the companies and battalion, while in the former, the movements of the companies and battalion depend entirely upon the success or failure of the firing line. This want of reality cannot be changed during peace exercises by regulations, for it is impossible to prescribe that the first line of skirmishers shall regulate the entire battalion. But it is essential to know that such a difference between peace and war exists in order to avoid teaching movements that require artificial, complicated movements of the firing line, impossible in actual warfare.

The battalion commander will give the final impulse for storming the edge of the village, unless it has been forced before that time, by leading in the last company to the charge. As soon as this last company has been launched into the fight, nothing more can be done but to give the word "Charge! Charge! Hurrah!" No time then to consider whether the first rush was ordered too soon or not, or whether the companies might have been better employed more to the right or left of the line, or that a better point could have been selected for attack. At this moment every change or movement is paid for in time and blood; the quicker the decision is brought about the cheaper the victory.

In answer to your question how to proceed if infantry has no artillery support, I answer first that in this case it is absolutely essential to be stronger than the enemy, either in numbers or in the excellence of the men. You will certainly agree with me in discussing this question that we must take it for granted that the assailant is usually the stronger, otherwise he would cease to be the assailant and must act on the defensive.

If it be impracticable to approach the village unobserved, and this we accept since we are discussing an attack over open ground, then the only remedy is to replace artillery fire at 1000 to 1100 metres by the fire of infantry. Of course this will be at the cost of an enormous expenditure of ammunition, that only can take the place of absent artillery. The percentage of hits at 1000 to 1100 metres is known to be very small and we shall be forced to use two and even three sights to cover even half the 400 metres which form the danger zone of shrapnel fire. Of course we must make good this expenditure of ammunition by a resupply, before the men are permitted to advance farther to the front. At 1000 to 1100 metres it will be possible to bring up the ammunition carts. This distribution, however, requires time, while the advance ought to be carried out under cover of the long range infantry fire. For this reason I would designate that portion of the infantry for long range firing which it is intended to employ as a last reserve. This portion ought to keep up the fire until the most advanced line has approached on the flank of the first near enough to the village to open fire at short range as did the Franz Regiment at Le Bourget. It will then replace its expended ammunition and follow as the reserve of the attack which by this time is alternately advancing its wings by rushes.

Do not lose patience if I give in detail my idea of how a battalion should be worked in this case.

The first company deploys and advances to within 1000 or 1100 metres of the village (if practicable gets up to 800 or 900 metres) and then opens fire with several sights. On its left march the second and third companies in strong skirmish line, each forming the right and left flanks respectively of a single line in *échelon*, as did the first line of the Franz Regiment.

Their firing line on arriving at 500 metres will lie down and open fire. This will require about 15 minutes, because advancing alternately by wings takes twice the time for advancing continuously. The first company, the first sent forward, will open fire before the arrival of the remaining ones in line with it, and must make allowance for the smaller percentage of hits by increased expenditure of ammunition. It will fire formed in groups, not too extended, and as the company is without the effective zone of the enemy's fire, the men well in hand and the noise not great, volleys in rapid succession should be used. As soon as the 2d and 3d companies arrive at 500 metres and commence firing, the first company will form in open attack formation and replenish ammunition from the carts as it probably took 50 rounds for each man to keep up the long range fire. Thus the battalion is divided as follows: The 2d and 3d companies with their skirmishers about 500 metres from the village, their supports 200 metres farther to the rear; the 4th company, forming the second line, on the left in open order; while the first, just formed in open order, is receiving ammunition. From this

formation the attack will develop itself. If I am to answer how strong an enemy I should hope to overcome by the attack of such a battalion, I should be compelled to own that I consider success questionable even if the enemy were half as strong as the assailants. It would be wiser, with these odds, to contain the enemy with one company, intrenched along his front, while the three others act against his flank or try to turn it, but this is not the problem as we are dealing only with a frontal attack.

The prompt replacement of ammunition is now one of the most difficult problems in war. Of what avail are skillful strategic manœuvres or the heroism of the troops, if the men find themselves at the decisive moment defenseless before the enemy? In 1866, I experienced this bitterness when at the decisive moment, the ammunition was found to be deficient. Other artillery lines fared still worse than my own. As a consequence of this I have pondered much on the question of ammunition supply during action. In 1870–71, as soon as my position made it part of my duty to provide ammunition for an entire corps, I had opportunity to work out in practice the result of my former studies on this subject; though with great toil and difficulty, aided by the unwearying activity of the personnel of the branch, I succeeded in facilitating the supply of ammunition to such a degree that in my corps not a single instance occurred where ammunition was lacking. It is true that at both wars the expenditure of ammunition by our infantry was but small; in 1866 it averaged only 5 to 11 rounds per man. In 1870–71 when I had to send back all five artillery ammunition columns empty, but few infantry ammunition wagons went with them. Thus my experience has been mostly with artillery ammunition supply. But the general principles are the same for both and apply equally to infantry. Moreover we must consider this important question in time, especially as we shall in the future shoot at longer ranges and therefore use more ammunition.

In 1866 we used less infantry ammunition because of the superiority of our rifle which quickly decided the infantry fights. In 1870–71 our rifle did not carry half so far as that of our opponents, and our artillery had to perform much of the work which the French entrusted to their infantry. In future wars when our rifle will be as good as that of our opponents, the expenditure of ammunition will be increased by one-half.

But the conditions of future combats will be of an entirely different character, because actions of the same duration will take place at longer ranges; and when at closer distances, the opposing lines, both intrenched, will wait longer for their enemy to be shaken before proceeding to attack with the bayonet; while the victory will often fall to that side which has the last cartridge in its pouch.

Although we never in 1870–71 had to suffer for want of infantry ammunition; our opponents, who then had a longer range rifle than ourselves, frequently experienced this mishap. After I had established my batteries on the heights to the right of St. Privât, the enemy gave me plenty of time to take up a strong position before he attempted to dislodge me by the attack from Amanvillers. An aide-de-camp of General Ladmirault told me a few years later that he was sent to two infantry regiments, immediately after I had appeared on the heights, with an order from the general to take

my batteries at once. But these two regiments could not show a single cartridge. The aide-de-camp had to return therefore and bring up other troops, but by that time we had found our position, discovered the range to various points, had our batteries increased by others and as soon as the attack commenced, dispersed these troops by our shell fire. In the absence of official reports it cannot be ascertained how often the ammunition of the French was exhausted. It is a fact, however, that Bazaine gives this as a reason for not having continued his attacks on the 17th of August. Many other delays of that army, which up to that time had always acted on the offensive, might be traced to this source.

Many claim that the enormous expenditure of ammunition on the part of the French, thus giving rise to a lack of it at critical moments, was due to faulty fire-discipline which always causes waste. It is admitted that such was repeatedly the case. In the camps at Chalons the French were led by experiments to believe that their rifle fire at 1000 metres would be annihilating and the men were practised to shoot from the hip at a run. This fire, however, proved to be almost worthless at Sedan. Fire-discipline can, to a certain extent, limit waste of ammunition, but do not let us be misled by such expectations. Fire-discipline can prevent troops from firing until they arrive at the proper distance. By it we can, moreover, at long ranges keep the fire in hand by ordering volley-firing, when the expenditure of each cartridge is actually directed. As soon as the opposing forces are close enough for each man to see his enemy aiming at him, when numerous losses begin to occur, when certain sections have lost their leaders, and when their successors have not yet drawn attention to themselves as leaders, then these sections or groups commence a fire which, by those who have experienced it, is said to "roll," and this soon pervades the entire front. Then no commands are heard and any attempts to influence expenditure of ammunition must prove futile, for to use a technical expression, "individual fire has it all its own way." I do not wish to detract from the bravery of our excellent infantry, but there are always many with whom the noise of firing serves to keep up their courage, for no one wants to be killed and these men seek to silence the fear of death by a great noise. At times when the "Hurrah" would not yet be appropriate the report of the rifle must continue its uproar in order to excite the blood and heat it—fear of death chills a man's ardor.

Then there is the rage which takes possession of the individual when he sees his dearest comrade drop or feels the sting of a wound. I remember well the anger of a colonel who, upon being slightly wounded, snatched the rifle of a wounded soldier and refused to go to the dressing station until he had killed or wounded three of "those miserable fellows who had dared to injure him"; he succeeded, but was finally carried back with three wounds. Therefore when the fire-fight is in full swing, when "independent fire has it all its own way," then we cannot hope longer to control fire or save ammunition. This is a factor which must be taken into account, for its influence is irresistible. Even when a heavy artillery fire is in progress, it becomes difficult to keep the fire regularly in hand; and in this case each man cannot work his piece at will. It is no longer possible to exer-

cise any influence over infantry when once the men are excited by a hot fire. In this state of affairs, when acting on the offensive over open ground, a renewal of ammunition is entirely out of the question.

If therefore, we wish to prevent the failure of an offensive movement through lack of ammunition, we must take the necessary steps to avert its excessive expenditure in the early stage of the contest. This can be attained only by delaying the attack until the enemy has been obviously shaken by the effect of artillery fire ; but once commenced, the attack must be carried through with energy, making use of the supports, and eventually of the second line, that the period of actual fire combat may be shortened as much as possible by decisive use of available forces.

But this will be practicable only when the attack has been properly thought out, and when the co-operation of both arms has been previously concerted as at Villejouan. Troops which have been compelled to open fire at 1000 or 1100 metres must be again supplied with ammunition while in the firing line, even though they have expended but little of their original store, before being allowed to advance. All pauses which occur in the close combat must likewise be made use of to give every man his full allowance of ammunition. This is a fundamental principle, for we never know what the demands of the next moment may be. Not only pauses in action at short ranges, but also times when the enemy fires at long ranges, must be taken advantage of for the renewal of ammunition. The fight at Villejouan offers a good illustration of this. After the place had been taken by our infantry, the enemy advanced again in force to retake it. The infantry were replenishing their ammunition when the horses of the ammunition wagons were killed, which shows that there could have been no real pause in the action.

In my opinion the leading principle in vogue with us (there are no prescribed rules for conducting ammunition wagons) tend to keep them too far out of action. We are prone to keep them out of fire, just as in former times was the case with the artillery caissons. What consequence is it if once in a while one of these wagons does blow up? It is in any case preferable to abandoning the troops to the enemy without ammunition. Even if some horses are killed, what of it? This damage can be remedied after the battle, and for the moment we shall have ammunition. The horses belonging to the ammunition carts of the 76th Fusiliers at Villejouan were but a small price to pay for such a result. We often hear terrible stories of what happens when an ammunition cart blows up, and how we must avoid exposing such wagons unnecessarily by bringing them too close to the firing line. I know by experience that the danger is much less than is imagined. At St. Privât all my batteries had their caissons of the first column in line next to the firing line by order of Colonel Scherbening, in order to replace every shot fired. They remained in that position all the afternoon exposed to artillery and infantry fire at 900 to 1000 paces. Not a single wagon blew up that day. But several limbers exploded, one of them just as an officer was bending his head to examine it. He fell back, had a headache for a few days, could not hear for a week, but is to-day in the service, on the general staff.

When we read in the account of the battle of Valmy, 1792, that two wagons exploding, caused disorder in the entire French army of Dumouriez I simply don't believe it. One shrapnel or shell, falling directly into a column, will cause three times as much damage as an ammunition wagon which blows up.

It has been suggested to me that every man receive 10 additional rounds before entering into an engagement. This is a good idea but cannot always be carried out. At times it may be possible as at St. Privât, where the attack had been contemplated hours before it took place. But in action, such as Worth and Spicheren, which have the character of accidental meetings, either time will be wanting or valuable time will be lost by making use of favorable moments.

Want of habit also prevents the prompt replenishing of ammunition. At the manœuvres, infantry but seldom has ammunition wagons assigned to it, for the soldier can without difficulty carry the ammunition which he uses. In the VI Army Corps, horses from the train were sometimes used to indicate the whereabouts of the ammunition carts in a flight, and then it was easy to see how little consideration was given to this matter in time of peace. I had constantly to make observations in regard to these important wagons which the troops regarded as useless and in the way. The orders never came in time, so that one might be certain, if a battalion had to retreat, that the men would run right past the wagons, which then marched between their own troops and the enemy. The idea struck me to carry the breakfast of the men in these carts at manœuvres, then I felt sure that the entire battalion would have thought of them, especially if it were laid down that in case of capture the contents should go to the captors. Unfortunately, this idea failed on account of the instructions of the Commissariat which alone can regulate the supply of food to the troops.

At any rate it would be extremely desirable, if practicable, to have the ammunition wagons present with each battalion at the manœuvres, so that the battalion commanders might thus become accustomed to give timely orders about their movements and pay necessary attention to ammunition supply. General instructions are not sufficient, each and every situation being different. Each commander ought to consider it an important duty to replace each round expended as soon as possible, that the men may always have the full allowance in their pouches and packs. Only by such precautions was I enabled in 1870–71 to have each piece carry its limber full of ammunition for use at critical moments; I made them take the ammunition from the wagons before touching that in the caissons or limbers.

I have already observed that general instructions are of no avail. I will go farther than that. General Orders even are of no use unless each authority and person connected with their execution takes the greatest care to ensure their fulfilment. I think I hear you exclaim: "Then it must be the devil's own doing if such orders are not obeyed." I assure you it is the devil's doing, he has his hand in it. It does not help matters to say: "The most positive orders were given, why did the battalions neglect them?" What is the sense of such remarks?

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The battalions have suffered losses, the commanders who have failed to carry out the General Orders are dead, hence the failure to obey such orders.

Before leaving Berlin a general order was issued at my suggestion, for I had charge of the ammunition supply, that in each action the commander of the artillery should notify the divisions of the exact position of the ammunition columns, and that after each battle the divisional commanders should report to the corps commanders that the battalions were fully supplied with ammunition, or if not, why not. At the battle of St. Privât I notified the divisions that the infantry ammunition-columns were at Batilly, from whence the carts might be refilled. On the next morning not one report was sent in. I investigated on this occasion by riding about through the bivouacs, and found that but few of the majors and adjutants who had read the order were still in their places; most of them had fallen! So I had no one to blame. I then rode from one battalion to another and caused the ammunition supply to be renewed, for I could not hold the ensigns and young lieutenants who were then in command of many of the battalions, responsible for the neglect of the order; for this reason also, I made no report of the omission.

I should wish to draw attention to another point which I have learned from experience. The regulation for the renewal of ammunition, and consequent procedure, should be freed from all red-tape and complicated accounts. Troops which are fighting do not like to calculate and write. Returns of accountability, like Form F, are always a bore. One who risks his life for honor and duty feels himself free from such accountability, since in the next half hour he may account for everything with his blood. Is it at all probable that a force would desire to filch 10,000 rounds? Of course it would be easy to report 10,000 extra cartridges as expended. But who would ever think of making away with ammunition in war? What would he do with it? Therefore too close adherence to forms should be done away with.

In my earlier campaigns I repeatedly experienced how unnecessary was the burden which the periodical returns of ammunition imposed upon the troops, and came to the conclusion that it simply delayed the issue of ammunition if receipts had to be given before these issues could be made.

These requisitions and reports did not ensure control, and I added the following instructions to the above mentioned order: "That ammunition in whatever quantity required, should be issued to any soldier who came to the column during action with an ammunition cart or wagon, he giving his receipt on blank forms kept ready with the columns, stating the number of the company, battalion, and regiment for whom the ammunition was drawn. If the soldier could not write, his mark was to be accepted. I put aside the idea that such liberality might result in waste of ammunition, by the thought that it would be better to lose 10,000 cartridges by not accounting for every one, than to leave a single company without ammunition in action. But even this was not always sufficient as regards artillery during the last war. For we had to break up the columns and while in action bring up the dispersed wagons into the firing line. Such will be the case with infantry in the future.

The following method should be observed.

The fighting forces must always be made to replace expended ammunition in time and as best they can. Those who have charge of the ammunition columns must regard it as a sacred duty to bring up ammunition to the fighting line, which they are supposed to supply whenever practicable, even without any orders; for the commander of the troops has no time, while directing an engagement, to call up the column nor means of sending an order. Especially after each severe combat, after each fierce attack, when the increasing roar of battle suddenly ceases as if by magic, every chief of the ammunition train must strive with all possible speed to reach his troops.

FRENCH INSTRUCTIONS FOR FIELD ARTILLERY AMMUNITION SUPPLY.

(*Approved by the Minister of War June 25, 1890.*)

Translated by LIEUT. J. C. BUSH, 5th Artillery.

AMMUNITION SUPPLY OF THE LINE OF BATTLE.

THE ammunition supply of the line of battle is organized as follows:

For Infantry.

1st. The cartridges carried by the men and those contained in the caissons of the battalion.

2d. The cartridges carried by the caissons of the infantry munition-sections.

For Artillery.

1st. The ammunition contained in the battery chests.

2d. The ammunition carried by the caissons of the artillery munition-sections.

The munition-sections of infantry and artillery form part of the *train de combat* (reserve train) in the columns. They carry the first reserve supply designed for distribution, if needed, on the field of battle. Although intended more especially for one particular division of infantry or one group of batteries, yet on the battle-field, if the case be urgent, they should deliver ammunition to any troops whatever placed in their vicinity.

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ARTICLE 6.

a.—*Mounted Battery Detached.*

On the battle-field the battery is divided into two parts: The first part (*batterie de tir*) is composed of six pieces and three caissons. The second part (*échelon de combat*) comprises six caissons, the battery wagon and forge.

The *échelon de combat* is placed, as a rule, under the orders of the adjutant (a non-commissioned officer). The distance between the battery and the *échelon* should not exceed 500 metres and should be reduced as the needs of the battery become more urgent, notably in the last period of the fight. The *échelon* should be placed, as much as possible, out of sight of the enemy, outside the zone struck by his projectiles, and in easy communication with the battery.

While clearing the way to the battery the *échelon* is kept near at hand in order, at need, to change place rapidly. It is halted in column. The park is afterwards formed with intervals permitting the supply caissons to come up between the empty ones.

The adjutant sends immediately to the captain the corporal detailed to act as orderly (*agent de liaison*). Replacing ammunition is done by an exchange of wagons between the battery and *échelon*.

When the rear chests of the caissons become nearly exhausted, the *sous-chef artificier** reports the fact to the captain who directs the adjutant, through the orderly, to send three caissons from the *échelon*, and, if necessary, a resupply of men and horses. The adjutant sends them under command of the orderly corporal. On their arrival, the *sous-chef artificier* directs these supply caissons to the vacant places behind the pieces.

The empty caissons wheel, and with the men and horses whom the captain sends to the rear, are conducted to the *échelon* by the orderly. The full caissons are placed in the first line of the *échelon*, the empty ones in the second line.

When the battery requires new caissons, the adjutant sends to the munition-section for an equal number by the orderly of that section. (See article 7.)

If the battery commander has not sent a receipt with his request to the commander of the munition-section, the adjutant will make one out, taking care to state for what fraction of the troops (number and calibre of the battery) the ammunition is intended, and return it by the orderly whom the section sent to the *échelon* the moment it arrived on the field.

When the supply-caissons, commanded by a non-commissioned officer of the munition-section and directed by the orderly, arrive at the *échelon*, the adjutant takes necessary measures for facilitating the transfer of the ammunition. This transfer is made under the supervision of the quartermaster-sergeant.

b.—*Horse Battery Detached.*

The *batterie de tir* comprises six pieces and two caissons. Seven other caissons and, ultimately, the petard wagon remain in the *échelon de combat*. The caissons are replaced in groups of two.

If the captain fears that two caissons will not suffice for the battery, he takes two others with him or causes them to come up.

When a single battery is detached with a troop of cavalry, the *échelon* is not taken, but the captain keeps the *échelon* orderly near him.

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* In the French service the *artificier* attends to cutting and fixing fuses, filling shells, etc.

c.—*Group of Batteries.*

The group includes, as a rule, three batteries on a war footing; a group of corps artillery horse-batteries contains but two.

A reserve officer, assistant to the group-commander; or at need, a lieutenant of the active list, who is then replaced in his battery by the reserve officer, has command of the *échelons de combat* of the different batteries united on the same spot. Dispositions similar to those prescribed for a single battery obtain for the group.

The duties of the commander of *échelons* in the group are the same as those of the adjutant in a single battery. The supply is made according to the same principles.

If in consequence of peculiar circumstances a battery is threatened with lack of ammunition at a time when the other possess enough to permit them to await the arrival of another supply from the munition-sections, the *échelon* commander informs the chief of it. The latter then orders the battery in question to be resupplied from the *échelon* of another battery of the group.

The *échelon* commander opposes all transfer of ammunition to batteries not of his group, unless, in each case, he receives an order direct from his chief or from the commandant of artillery.

Communication between the battery *échelons* of the group and the munition-section is secured through the medium of a sergeant and corporal whom the section sends as soon as it finds a place on the battle-field.

If one of the batteries is detached from the group, the *échelon* belonging to it follows immediately on being relieved. The adjutant reports the fact to the *échelon* commander who detaches from this adjutant a corporal orderly (preferably the one detached by the munition-section).

d.—*Group of Batteries Attached to a Division of Independent Cavalry.*

The *échelons de combat* are left with the regimental train.

Exceptionally, if the squadron chief (cav.) apprehends that he may lack ammunition on the advance march, he can take with the batteries, an ammunition train placed under the orders of the officer designated to command the group *échelons*. This train comprises at most two or four extra caissons per battery.

e.—*Several Groups United.*

The supply is conducted as prescribed for single batteries or groups of batteries.

ARTICLE 7.

Dispositions Relating to Munition-Sections.

General Dispositions.

The general commanding all the artillery of the army corps has among his duties the ammunition supply-service for all the troops of the corps.

The munition-sections of the army corps are divided into three groups,

each forming part of the artillery of either division or of the corps artillery and placed under the orders of the colonel or lieutenant-colonel of this artillery.

Marching and Placing the Munition-Sections.

The munition-sections should follow the troops closely, so as to furnish them with the necessary ammunition without delay.

In the normal order of march of the army corps the three groups of munition-sections generally follow each other in the train in the same order as the portions of the army corps to which they correspond, and behind the engineer park.

If the army corps marches on two roads, the groups are divided between the two columns in the same manner as the parts of the corps to which they belong.

In each group the senior captain takes command, retaining also the command of his unit. When all the sections of the corps are united, this officer places himself in communication with the general commanding the artillery, in order to receive his orders directly. When they are placed at the disposal of the divisions or of the corps artillery, this officer places himself in communication with the commander of the divisional or corps artillery.

Munition-Sections in the Division.

When a division operates alone, the sections pertaining to it follow, unless orders to the contrary are given.

When a division on the march becomes engaged, the general of division orders the artillery commander to halt the munition-sections at a designated point, about five kilometres in rear of the firing line. The sections do not pass this point without a new order. When they reach the appointed place, the officer in command reports their arrival to the artillery commander and keeps in communication with him, asking for new instructions if necessary.

Whenever the fight takes a favorable turn, the general causes the sections to close up nearer the fighting line, he indicates to the artillery commander what place to occupy and informs the generals of brigade where the infantry section will be posted. From this time on, the munition-sections of infantry and artillery follow, at proper distances, the troops which they are appointed to supply, and deliver to the different forces the necessary ammunition.

The separate sections maintain communication with the artillery commander, receive his instructions, change place according to his orders or report their own changes.

If the fight remains undecided, or takes an unfavorable turn, the general causes the munition-sections to push forward those caissons strictly necessary to the supply of the artillery and infantry.

If a movement in retreat becomes unavoidable he fixes a new point of assembly for the sections as soon as possible. This is chosen sufficiently far to the rear that the sections may not obstruct the movements of the troops.

Munition-Sections in the Army Corps.

When the munition-sections of the division and corps march together, the corps commander, at the beginning of the fight, directs the general of artillery to move them forward without, however, closing them up nearer than five kilometres from the line of battle as a rule. The group commanders report their arrival at the appointed place to the general of the artillery through the section orderlies.

The corps commander places the sections at the disposal of the divisions and of the corps artillery as he may deem necessary. The general of artillery, in transmitting this order, indicates to the sections the points to which they must repair to find their division or the corps artillery.

Upon their arrival on the field, the chiefs of each group of division and corps artillery sections place themselves in communication with the commanders of the divisional and corps artillery respectively. The sections are posted in accordance with the instructions of these superiors. As a rule they follow, at proper distances, the troops which they have to supply, and deliver to the different forces the necessary ammunition.

When the munition-sections of the army corps are divided into several columns, the corps commander generally establishes a line beyond which they shall not pass without new orders. If he does not, then the commander of each column halts all the sections at five kilometres, at least, in rear of the fighting line. The order for closing the munition-sections to the vicinity of the troops is then given by the corps commander or by the commander of each column, as the case may be.

The munition-sections are, as much as possible, halted near practicable roads, in a formation permitting the necessary movements for supply. They remain on the roads only in case of necessity, and are then placed on the right side in single file. They leave the road as soon as ramps have been constructed, and conform to instructions received from the commander of the divisional or of the corps artillery.

Each section commander takes care to leave a non-commissioned officer for some time on the spot he last occupied, for the purpose of directing to the new positions the caissons previously sent out with supplies or the orderlies charged with the transmission of orders.

The munition-sections collect, as far as possible, the material which the batteries have left on the field.

The position of each section is indicated during the day by a small yellow flag for the infantry and a blue one for the artillery section, and during the night by lanterns of the same color as the flags.

Replacement of ammunition.

The supply by munition-sections, as well for infantry as for artillery, should always be done by transfer and not by exchange of wagons. An exception to this rule is made in the case of infantry actually engaged when an exchange of wagons becomes permissible. In urgent cases on the battle-field the decision regarding a similar exception for artillery ammunition rests with the general officers.

As far as possible the supply of all the batteries of a group should be

done at the same time, so as not to multiply, beyond measure, the goings and comings at the groups of caissons.

Replacement of men and horses.

The munition-sections will furnish men and horses to the batteries only on the order of the commander of the divisional or corps artillery.

On the battle-field the infantry munition-section of the division will furnish horses necessary to replace losses in the caissons of the battalion on the order of the division general, and, in case of emergency, on that of the infantry brigade commanders.

Supply after the fight.

After the fight the supply continues, according to the principles above given, even during the night and for the units in bivouac, unless orders to the contrary have been given by the corps commander.

As soon as the corps commander deems it practicable he gives orders to proceed to a general supply. To this end he establishes points on which the various sections shall be directed or reunited, for the purpose of forming centres of supply. Each fighting unit sends a detachment of men and wagons. As far as possible the detachments directed on the same supply centre are gathered in one column under the command of an officer. The supply is made on the usual requisitions.

Military Notes.

THE TACTICAL VALUE OF THE ELECTRIC LIGHT.

AT the Aldershot Military Society, Maj. R. L. Hippisley, R. E., read an instructive paper on "Electricity and its Tactical Value for Military Operations."

He first referred to the historical aspect of the subject, and then pointed out that the principal uses to which the electric light can be put for war purposes were as first-class lights for fortresses, coast defenses, war vessels, and submarine mining operations; as semi-portable lights for embarkations, etc.; as portable lights for field operations; as portable lights for land mining operations; and for signalling purposes. Confining himself to the consideration of portable lights for field operations, Major Hippisley observed that the siege of a fortified place would no longer be the comparatively simple operation of constructing works at night and firing from them during the day. The construction of the ordinary siege works in the method hitherto adopted would not be possible except at an enormous sacrifice of life. But this disadvantage on the part of the attack can be greatly obviated by the employment by them of electric search lights; for it has been shown from the Milford Haven experiments in 1886 that an electric beam can be used as a screen, behind which operations can be conducted in secret. In order to produce this screening effect it is only necessary that a powerful search light should be placed in front of the flank of the ground to be hidden, so that its beam may be projected in front of it. Not only will the electric light produce cover behind which parallels or siege batteries can be commenced, if the nature of the ground and the shape of the fortress admit of it, but it can also be used with great effect for the direction of the guns subsequently placed in such works. The firing can then be carried on at night with almost as great accuracy as during the day. Guns were laid by night at Lydd in 1886, on a work illuminated by a beam from a flanking position 1200 yards distant from it.

In the defense of a position against an expected night attack there is nothing to lose by the search light and everything to gain. For it has been conclusively shown that the light can be so placed as not only to reveal nothing of the defenders' position and movements, but so that it actually affords additional security to them by the depth of the obscurity which it casts over objects in its immediate vicinity, which are out of the reach of the beam. The apparatus is extremely difficult to hit. This is on account of, firstly, the difficulty of estimating the range, even with tolerable accuracy; and, secondly, because without special appliances, it is almost impos-

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sible to aim at the light. The experiments at Shoeburyness in 1883, at Lydd in 1887, and at Okehampton in 1888 gave remarkable evidence upon this point. To utilize the light to the best advantage for field defenses, it should *not*, as a general rule, be kept continuously burning all night. It is not to be expected that it will relieve the pickets and patrols of the necessity for their usual vigilance, and if it is continuously displayed it will afford the enemy a beacon to steer by, whilst they are out of range, and so mitigate one of the most serious difficulties of a night attack. The light should not been shown until the enemy has been reported, and when he may reasonably be presumed to be within reach of the defenders' fire. The effect of a few well-directed rounds under such circumstances at pre-determined ranges will be immense, especially as the enemy cannot be expected to have succeeded in maintaining a rigid formation during the latter part of his night march. The defenders will have the advantage of noting where every shot goes and the result of every volley, whilst the enemy will have no idea of the effect he is producing. His infantry will even be unable to aim, because they will see nothing but the light, and if they fire at that they will be unable to see the sights of their rifles. In the trials made at the North Camp Redoubt during the manœuvres of the 2d Field Column last July the light would not have revealed the outline of the redoubt at certain times if it had been properly manœuvred. Under favorable conditions small bodies of infantry may be detected with ease at 2000 yards, but more generally the useful limit is reached at 1500 yards.

The things required to produce a search light are: a boiler, a steam engine, a dynamo, a lamp, a projector with condensing mirror, and certain small accessories.

Lights worked by primary batteries have been tried at Aldershot and Chatham, but engines and dynamos form the most efficient means of generating the current of electricity, and are, on the whole, far preferable for actual rough wear. Lights intended to accompany the march of an army should be of two sorts—one a traction engine equipment and the other a horse equipment. The first would always be used where possible on account of its greater power and penetration, and the second should be used whenever the first cannot be brought to the point required.

After describing the equipments of foreign armies, Major Hippisley observed that we are not yet fully alive to the advantages and importance of possessing portable search lights for field operations. Many experiments have been tried in England with search lights of various degrees of portability, but as yet there has been only a part of one equipment recognized for field operations, and that is the steam traction engine and dynamo exhibited at the manœuvres last year. There is yet no special vehicle for carrying the projector. Valuable as the traction engine is, it is not enough, and we must also have a lighter apparatus for the horse transport.

DISCUSSION.

Colonel Lonsdale Hale said: I asked a question on one occasion as to whether the electric beam would penetrate Colonel Crease's smoke. Some people seem to think Colonel Crease's smoke a fad. Now, I have seen it

tried at Portsmouth, and it is not a fad. At present the apparatus is somewhat cumbersome, and if Colonel Crease can reduce it to portable proportions, it will become a potent factor in the attack on a position. In the course of the experiments at Portsmouth, a body of men advanced within 200 yards of a position unseen under cover of the smoke. I bring this forward in connection with the electric light because it is important to consider. Sir Evelyn Wood took me to the other side of the Fox Hills when the electric light was being tried, and I thought if we had this smoke cloud, which could be made very portable, it would render electric light comparatively useless in the field for search purposes. I think the smoke is one of the difficulties that Major Hippisley should have dealt with. With regard to another point mentioned by a previous speaker, there are very few battles carried on at night. If, instead of inquiring whether the electric light can be used for attacking purposes, we consider its use on the battle-field for the purpose of finding where the enemy is, I think we shall find that it may be uncommonly useful. After the battle of Coulmiers the defeated rested within a stone's throw of the men who had won the field. If the electric light had been there to search, the defeated enemy might have been pounced upon again; but in the absence of cavalry, they did not know that the enemy lay at their feet. With regard to pushing forward the specialties of engineers, I think there will be little success in this direction until the departments at Chatham are removed to Aldershot. Not the slightest progress can be expected with the useful specialties of the engineers until they are better established at Aldershot camp. I am afraid the terrible diagrams Major Hippisley has placed before us are not much understood. We have tried our experiments at Chatham, and no good at all has resulted. We want our experiments tried here among the rough and tumble of Aldershot in contact with other troops. Only by this means shall we be able to make these things practicable. To the officer commanding the Balloon Section I should say: "I am not going to trust you as you stand at present. I will let you know every scheme I am going to carry out, and you shall do your level best to make use of your opportunities, and as you overcome your difficulties you will become more and more useful." It is only by bringing our specialties to light and working them out that you who are not engineers will believe in them, and if we have not the opportunity to do this at Aldershot many useful inventions will remain pretty toys at Chatham.

The chairman (Field-Marshal Sir J. Lintorn Simmons) said: I have listened to this lecture with the greatest interest, but I think there are some points which require serious attention before the electric light is introduced into the service. I think there is great danger attending it, because people will trust to it instead of trusting to the outposts. Tel-el-Kebir is often quoted as a night attack that might be copied. On that occasion there were no outposts whatever—I think not. The march out at night was undertaken under favorable circumstances. There were no hedges or ditches to get through; yet on that march the troops very nearly came to a disaster. I am told that the wings closed on one another, while the centre did not march so rapidly, and the men came almost face to face. These night attacks are very dangerous, and should not be adopted except

under favorable circumstances, where the country is thoroughly well known, and the troops are well trained. Night attacks under other conditions will be attended with enormous risks. The troops when they arrive at the position, will be unusually fatigued, and they will be alarmed by noises in the night, so they are not to be depended upon in the same way as in the daylight. Major Beresford speaks of the electric light as having great moral effect. I do not believe in the moral effect of the electric light if used for purposes of attack. It might assist them in keeping their position, but I do not think it would assist them one atom on the march. It is very difficult to bring up three tons; as for four tons being drawn by four horses, you may as well try to move this hall with four horses. Four horses will not draw four tons over heavy ground, and on a newly macadamized ground they would not move it at all. You need not be afraid of a locomotive, although it could not pass over the bridges spoken of just now —bridges near the Staff College; still, they are capable of going over rough ground. Several years ago I saw eight or ten different kinds of locomotives tried at Birmingham. The course marked out was over a mile, over hedges and ditches and across ploughed fields. In a hedge an opening was made a little wider than the engine, and earth was thrown into the ditches. The locomotives were started, and they went over the fields and ditches, and it was quite an interesting steeplechase across country. Some of them stuck fast, I believe, and were never got out, but the majority of them got to the end of their journey and did remarkably well. You need not be afraid of the locomotives; they are best both for short and long distances; they are reliable and do not get out of order as quickly as horses, and their "forage" is not so difficult to procure. There is another important consideration in connection with the electric light as a search-light. When used for coast defense you have a great expanse of level plain, water, and therefore the light can be thrown a very great distance without meeting with any obstacle. On land it is seldom that you get such a favorable level, and it is seldom that you find a plain in which there are not holes sufficient to conceal large bodies of troops and whom you could not see unless there was a man up in a balloon while the electric light is being used. —*United Service Gazette.*

RECENT ARMOR-PLATE TRIALS.

In 1890, competitive plate trials were instituted by the governments of Russia and the United States. The latter took place first, being carried out at Annapolis, on September 18th and September 23rd last. Three plates were tested, each 8 ft. by 6 ft., and about 10½ inches thick, weighing about 9.4 tons. Two were supplied by Schneider—one of steel, hammered and made on his usual system; the second differing only, so far as is known, in containing 5 per cent. of nickel.

The Russian competition took place at Ochta, near St. Petersburg, on November 11th last, and very closely resembled the American trial in its conditions. One compound plate being sent by Messrs. Brown, made on the Ellis system, and two "all steel" plates one of Schneider's, which was found by subsequent analysis to contain 3 per cent. of nickel, and a

plain steel plate made by Vickers, of Sheffield. Each plate was 8 ft. by 8 ft., and about 10 in. thick; the weight being about 11.7 tons. Five forged steel projectiles were fired at each, two near the top corners, with a velocity of about 1984 ft., and two near the bottom corners and centre with about 2080 ft. The projectiles each weighed about 89.38 English lbs., they were made by Holtzer's men in Russia. The first two fired at each plate were a little softer than was desired by Holtzer; the last three were most excellent. It need hardly be said that a projectile which will strike at the plate with over 2000 ft. velocity and rebound, scarcely affected appreciably in form, must be quite one of the best quality, and this is what occurred generally on this occasion. The calculated perforation of the two projectiles first fired at each plate is 11.93 in. of iron or 9.54 of steel, and of the three last 12.50 in. of iron or 10.00 in. of steel. The respective energies per ton of plate being 206.3 and 229.2 ft. tons. The test was, therefore, less severe than that at Annapolis, but very closely resembling it. Here, again, the compound plate was completely perforated by the three last projectiles which all passed through the backing, and went on for a considerable distance, and it was badly fractured all down one end. Its face, however, was not broken away to any serious extent. The Schneider nickel steel plate behaved very much in the same way as the Schneider plate without nickel in America; that is to say it was the hardest of the three tested, and kept back the projectiles best, but it broke up badly, being in fact in pieces at the end of the trial. The Vickers' steel plate without any nickel in it corresponded to the nickel steel plate in America; that is to say it allowed the points of the projectile to come through, but it held together intact, although one corner was nearly detached by through cracks, and just as the nickel plate was preferred in America, so it must be assumed that the Russian authorities preferred the Vickers' plate, seeing that they have since given an order to Messrs. Vickers for armor for two gunboats. Two compound plates made at the Kolpino Works on Wilson's system, were fired at Ochta, one before and one after the competition. The former kept out the projectiles remarkably well, apparently behaving better than any of the competing plates; but it appears that some, if not all the projectiles fired were inferior to those employed in the competition in a greater or lesser degree. Thus, admirable, as the plate appeared to be, it is impossible to estimate its powers satisfactorily. Of the second Russian compound plate also it is difficult to speak, seeing doubt exists as to the quality of the projectiles. Judging from a photograph obtained and from the data supplied, the plate behaved very well.

The facts thus given of the above mentioned experiments constitute nearly all the data at present available for forming an opinion on the future prospects of English and foreign armor-plates, which may now be briefly discussed. First, with regard to nickel, it may be seen that at Annapolis a plate containing 5 per cent. of nickel displayed great resisting power, both to perforation and fracture. On the other hand, at St. Petersburg, Vickers' plate, containing no nickel at all, bore the same relation to one containing 3 per cent. of nickel that had been seen in the opposite direction of Annapolis. The difference between 3 and 5 per cent. is a substantial one. This

would reasonably account for much less characteristic behavior, but not for a complete reverse in the relative behavior of nickel steel and pure steel. It has been reported that the French Government do not propose to adopt nickel, and in America that nickel is affected so as to lose its value in frost. There was a sharp frost on the day of firing at St. Petersburg; but something much more definite than is at present known is necessary to justify us in accepting this explanation. It is, however, reasonable to say that nickel deserves attention because Schneider, who probably knows more about its action on steel armor than any one else, has been using it repeatedly, and in one instance, as we have seen, with marked success, although its characteristic action was not apparent on another occasion. * * ORDE BROWN, Captain, R. A.—*The United Service Magazine.*

A SELF-FITTING AUSTRIAN MILITARY SADDLE.

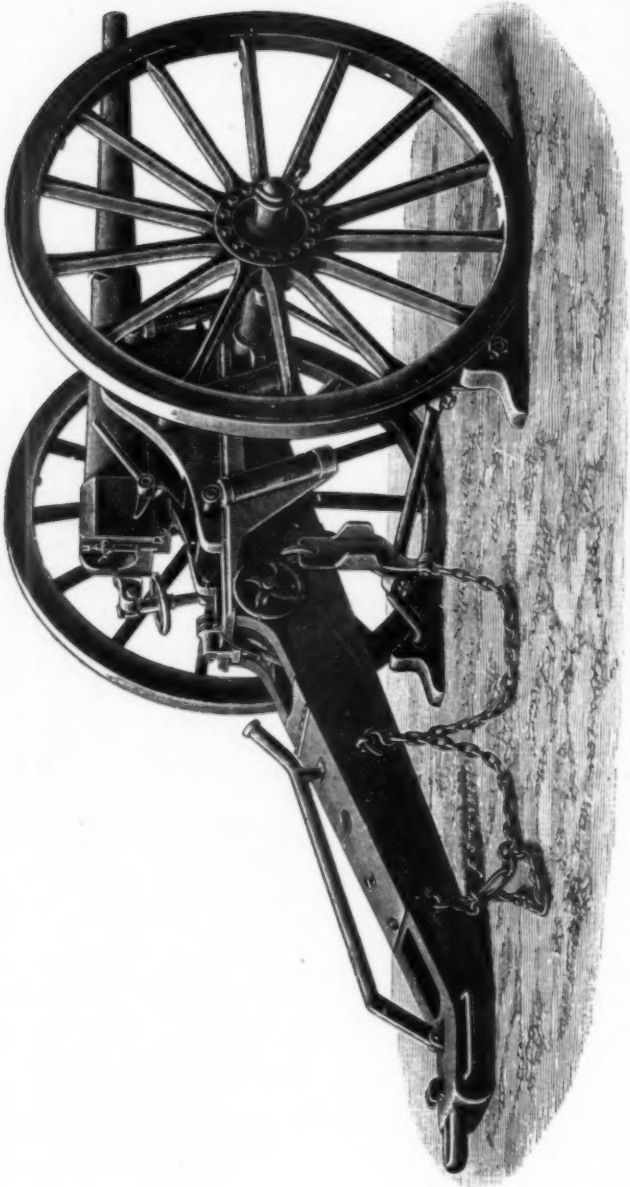
The weight of this saddle complete is 36 lbs. 10 ozs., which includes a blanket weighing 9 lbs.

It is manufactured and devised by a small Vienna saddler, Wilhelmy, and the advantages possessed by it were brought to the notice of General Keith Fraser by Austrian cavalry officers. In Austria the saddle has been extensively tried, and the reports on it are of the most favorable description. It produces no sore backs, and if used on a back so affected, the injury soon heals. A certain proportion of these saddles are now used in each Austrian regiment for horses which are especially liable to injury. The saddle is remarkably simple and ingenious; the front and rear arches are of iron and are hinged to the side bars; a narrow iron side bar hinged in four places connects the arches, and beneath this is the side bar proper, made of thick leather. It is impossible to give any clear account of the hinges, but their action is to allow the flexible leather side bars to adjust themselves accurately to the surface on which they are placed; by the introduction of four hinges alteration in shape of the side bar in front can be effected without interfering with the fit behind, and *vice versa*. No proceeding on the part of the rider is required to produce this fit, the saddle takes the same shape as the back when the horse is girthed up. With the saddle in our possession we have demonstrated beyond all doubt that it is self-fitting, and will fit any horse. As a *tree* it is the greatest advance in military saddles yet made. The seat is short, seventeen inches, and uncomfortable; it is riveted to the rear arch, and sewed to the front one; it is narrow and laced down to the side bars like the Hungarian saddle; over this seat goes another which has seat and flaps cut in one. The pannels are made of felt, and buckle on to the leather side bars. The girthing is effected from a central attachment to the side bar, and not from each end.

The saddle has a high cantle, and a pair of very large wallets.

The saddle tree (viz.: the arches and side bars) is perfection.

The blanket is very thick, like a piece of felt; the object of this is to render wrinkling impossible.—*Journal of the Royal United Service Institution, No. 157.*



HOTCHKISS RAPID FIRING FIELD GUN.

HOTCHKISS QUICK FIRING GUNS.

The Hotchkiss recoil mount for 6-pounder and 9-pounder guns are especially suitable for permanent mounting on board-ship or the heavier torpedo boats. The under carriage is held by a pivot forward, around which it can turn, while the rear is carried by wheels on a segmental path. The upper carriage, on which the gun is mounted, slides upon the lower one, and the recoil is counteracted by six powerful inclined springs contained in cylinders, and hung at the bottom to projecting pins on the lower, and at top to similar pins on the upper carriage. Only two pairs of these springs are normally in action, the third pair only coming into use in case of a failure in the others. Buffers are attached, two at each end, to the underframe to absorb any remanent shock, due either to the recoil or the return action of the springs. The spindle working the elevating pinion is square-ended, and the pinion slides forward on it, with the rest of the gun, during recoil, the handwheel being mounted on the fixed part of carriage, and being therefore free from shocks.

The carriages for field service resemble generally those in ordinary use, with several special features, however, that may be briefly referred to.

For rapid firing, in which it is necessary for the gun to be brought back to position without disturbing the aim, the carriage is of a heavy type, and consists of an underframe provided with slides, to which the upper carriage is connected by three sets of inclined springs precisely in the same way as the naval carriage already described. Brakes are also added to the wheels, and the trail has a spade-shaped anchor plate also fitted. The limbers of the various types call for no special remark. Finally may be mentioned a light type of naval landing carriage for transporting the smaller calibres used on shipboard for expeditions involving field work. This is a non-recoil carriage, so that rapid firing is not possible; its principal feature is its extreme lightness, so that the gun may be transported by manual labor.—*Engineering, London,*

Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that, as far as practicable, these "Comments" should appear under authors' names.)

I.

"Meritorious Discharged Soldiers."

Colonel Theo. W. Goldin, General Staff (retired) Wis. N. G.

I HAVE read with much interest the article of Lieut. J. E. Bloom in the March number of the JOURNAL, in comment on an article entitled "Meritorious Discharged Soldiers," which is on a subject in which I am deeply interested.

Speaking from personal observation, I can say that I am fully satisfied that life in the Army deprives many a worthy man of opportunities of getting on in life as well as of experiences that would fit him for contact with the world at large and enable him to "hold his own" in the struggle for existence.

To a great extent I think this may be attributed to the fact that outside of a very limited sphere, the average enlisted man is not called upon to think and act independently, or for himself, for a period of years varying according to the length of his term of service. And another thing. His associations, more or less intimate, with his officers, whose word has always been to him, as it is to everybody who knows them, a synonym of honor and uprightness, has not had a tendency to build up in his mind that keen watchfulness and ability to read his fellow man, so essentially necessary to enable him to enter into successful competition with men who have for years been acquiring their education in the hard school of experience.

Once an enlisted man myself, I never lose an opportunity to follow carefully the course of every enlisted man who comes within the range of my observation, and I have in mind to-day several young men of more than average intelligence, discharged from the Army by reason of expiration of term of service, who for perhaps a year or two have managed to get along fairly well, by reason perhaps of recommendations given them by the officers under whom they served, or by some comrade, more fortunate than themselves, who has managed to get a foothold in the business world. But at last there comes a time, when, by reason of a falling off in trade or other legitimate cause, they find themselves out of a situation and are cast on their own resources. Then their utter unfitness to battle with the world unaided becomes painfully apparent; they drift with the tide for a few months, fail to find an anchorage, and the next thing we hear of them they have gone back into the service again, moody and discontented and inclined to rail at the world that has given them no show to bring out what is in them.

I have always been in hearty sympathy with any move having for its object the bettering of the condition of the large number of worthy enlisted men who from year to year are turned out on the country; but I am free to confess that in this age of political spoils-grabbing I very much doubt whether the plan outlined by Lieutenant Bloom would or could be made practicable.

It has occurred to me, however, that some action might be taken on the part of Army people, looking to the recognition of a society already in existence, having for its fundamental objects substantially those outlined in the article in question. I allude to the organization known as "Veterans of the Regular Army and Navy" whose objects are for mutual aid and protection; to bind together in eternal unity all persons who have served in and who have been honorably discharged from the Regular Army, Navy, or Marine Corps of the United States; to aid, protect and provide for all members in sickness or distress; to secure to each a soldier's burial, and to look after and aid the widows and orphans of deceased members.

* * * * * * * * *

And to assist comrades in such other ways as opportunity offers and which must necessarily follow in an organization looking solely to the interest, welfare, comfort and happiness of its members who have served under the same flag and drank from the same canteen.

I am prepared to prove that this organization, in the comparatively limited period of its existence, has accomplished much in the way of aid and assistance to a class of men who in the main are deserving of every encouragement that can be given them.

There are many of us scattered throughout the country who, through exceptional advantages or perhaps unusual business abilities, have laid the foundation for what we hope will be future successes in business and professional life, who are more than willing to stretch forth our hands and in some systematic manner extend to our less fortunate comrades such aid as lies in our power. For we have never, even in the hurried pressure of business, lost that old feeling of comradeship that comes of associations with those who marched beside us many a long weary mile during our years of arduous service, and stood shoulder to shoulder with us on many a dangerous skirmish line.

With these thoughts in mind, it occurred to me that could it be so arranged that the active Army would recognize our work and co-operate with us, much more could be accomplished than can be done alone and unaided.

I am not, however prepared to offer at this time any suggestions as to what methods could be adopted to bring about what seems to me to be a much desired end, but prefer to leave that to be determined by those who are in a position to know just how far the Army people are willing to recognize and co-operate with an organization composed almost entirely of men who in the old days when we wore the "blue" could boast of no higher title than that of a sergeant, or a corporal, or at the most a sergeant-major.

II.

"Our Experience in Artillery Administration."

General J. C. Tidball, U. S. Army.

GENERAL HUNT'S excellent paper is an admirable historical sketch of our artillery from the beginning, in which he has seized upon the epochs of special importance as illustrative of its development.

While avoiding wearisome details, he carries us along in delightful narrative and points out the defects and disadvantages that have ever beset this arm of the service. He explains the difference between the Mexican War and the War of the Rebellion; the latter following so soon after the former as to be greatly influenced by it as to the methods and organizations to be adopted. From this he drops naturally into some of the disadvantages under which the artillery labored from the beginning to the end of the Rebellion; chief among which he mentions the lack of field officers

to exercise command of batteries in the field ; and here he touches the subject with a masterly hand, and with the force of personal knowledge and experience of unusual extent.

No less forcible are his remarks upon the use of artillery in masses. He sums up the results of all the evils in his last paragraph where he says that our artillery was from one-third to one-half less effective than it ought to have been.

This part of his paper should be enlarged. The new generation of military men, and many of the old, will want to know, or will ask how this happened and how it was manifested during the campaigns of the War. General Hunt has furnished the text from which a most instructive and not altogether uninteresting sermon can be preached ; and the lessons so dearly purchased by the War should not be lost. The great evil—and he strongly hints at it—arose from attaching batteries to small infantry commands (divisions and often brigades) where they were tied down to the narrow limits of such commands. There was no independence of command allowed to or exercised by artillery officers ; hence there was no opportunity for massing artillery upon decisive points, or bringing it together so as to act in concert until disaster, such as occurred at Shiloh, Stone River, Chickamauga and other places, forced the question, and brought together batteries as though by instinct. Dispensing with field officers and distributing batteries to small infantry commands were twin evils, and from them arose all others.

In the Confederate service the organization and command of artillery started out similarly, if not identically with that of our service, but it was soon changed to the battalion system, in which the batteries of each division (the divisions were about two-thirds the size of our average corps) were united into a battalion with a colonel or lieutenant-colonel in command, who had actual command as well as administrative control over his batteries, and, in addition, the weight and influence of his rank. Each two or three batteries had a major. This was the chief reason why, with artillery inferior in numbers, they could always bring to the point of contact such formidable fire.

In the Army of the Cumberland the batteries were attached to infantry brigades, one battery to a brigade of from twelve to fifteen hundred muskets in action. The disasters of Chickamauga demonstrate how an excellent artillery can be made almost entirely useless by such dispersion. Immediately after this battle a new organization and different system of command were given it.

The battle of Chancellorsville is full of instances of the mal-use of artillery ; it also has instances of the best possible use of it. The same may be said of Antietam. In short, nearly every battle has its lesson ; all pointing in one direction, viz. : that our artillery, for causes not in the least due to it, was badly managed, and that its brilliant and distinguished service upon occasions was in spite of the evils under which it labored.

III.

"Military Gymnastics."

Colonel J. J. Coppinger, 23d Infantry, U. S. A.

I LIKE Captain Foote's paper. I fully concur with him. We need gymnasiums at our military posts. We need them badly.

Let me tell you a short story. Some years ago I received orders to march some companies of infantry to the Missouri River. We were then stationed near the base of the Rocky Mountains, and the heavy snows of a northern winter had but recently disappeared. The lethargy enforced by a temperature frequently 27° be-

low zero had relaxed the muscular force of the men. The first day of the march was also the first warm day of the season. The command suffered, many falling out or falling down panting or fainting by the roadside before we could reach the first water.

I thought then, as I thought years before, how sadly we needed gymnastic training to keep our infantry people in proper training, especially at our Western posts. In Dakota the intense cold of winter months deprives us of needed exercise. On the Mexican border the great heat of summer interferes with much out-door drill. In both cases the gymnasium becomes a boon, increasing the activity and the endurance of the men, improving alike the muscle and the *morale*. Giving them amusement and self-confidence, it improves their manhood, rendering them more contented and better soldiers.

The results attained by the small gymnasium at David's Island without one cent of expense to the United States, are very gratifying, surpassing even my expectations, and my expectations were high. The service owes a debt of gratitude to Colonel Daingerfield Parker for the marked success attending his efforts.

My object, however, in advocating so strongly gymnastic training at recruiting depots, looked far beyond the depots themselves. I have for years wanted an entering wedge to open the way for gymnasiums at our large posts. Last year these depots furnished some 5000 men to the service. If they can furnish even 4000 recruits per annum, trained gymnasts, to the ranks, gymnasiums must soon follow the men who need them and from experience have learned to know their value.

To the infantry they come an especial boon. The horse furnishes, in grooming or riding, more or less exercise to the trooper at all seasons of the year. But away in the far West, with a temperature above 100° on the Rio Grande, or far below zero in Montana, the gymnasium, valuable to all, should become the especial refuge of the infantry soldier; needful for his set-up, needful for his health, his muscle and his *morale*, when extremes of heat or cold tend towards indoor life and relaxed muscles. One look at the tense muscles and the merry faces of squads at their gymnasium work tells the whole story.

Major John Brooke, Medical Dep't, U. S. A.

Captain Foote's article on the workings of the gymnasium lately established at David's Island, chronicles the early results of a new departure in our military service. Hitherto the physical instruction of enlisted men has been limited to the optional use of the necessarily incomplete arrangements which could be provided by company officers for the men of their immediate commands. The establishment of a well-equipped gymnasium by orders from the War Department, with instruction compulsory, is an entirely different matter. It is to be hoped that this is but the beginning, and that similar establishments, providing for the better physical instruction and development of all enlisted men, will soon follow at all the larger posts.

That such instruction is desirable for the recruit goes without saying; and if, with the older soldiers, it can be made to take the place of some of the monotonous company drill, it will be doing the state some service.

In matters pertaining to physical development we can generally consult with profit the customs followed by the civilized nations of the Old World. The traditions and superstitions of the early civilization of the East, as well as the fables and legends of the Greeks and Egyptians, usually have references to physical exercise as a means of preserving health and of developing the faculties generally. The significance of *mens sana in corpore sano* was understood before the words were written by Juvenal. The earliest known exhibitions in which the victors in feats of strength and agility were crowned, and accorded public honors, were the Olympic games; and their origin

dates so far back that it is lost in the twilight of fable. In historic times the contestants were required to undergo a course of training for ten months in the gymnasium at Elis, before they were allowed to participate in the games.

The Greeks were a nation of soldiers, and the gymnasium at Elis developed the soldier as well as the civilian. Alcibiades was master at Athens by reason of "his force of eloquence, grace of person and strength of body." Lycurgus framed laws by which a city was governed for five centuries; but he also gained a sanctuary, and thereby saved his life by being able to outrun the mob which pursued him.

In the Roman army gymnastic exercises formed a part of the military instruction; and the Campus Martius daily witnessed scenes less warlike than exploits with the bow and the spear. Pompey may have had an eye on the Roman Senate, wishing to demonstrate the lack of necessity for compulsory retirement on account of age; but the fact remains that when almost threescore years of age he could run, jump and carry a load with the best men of his army. "Cum alacribus saltu, cum velocibus cursu, cum validis vecte certabat."

In the armies of modern Europe the importance of intelligent physical culture is thoroughly appreciated. It was revived by Prussia early in the present century, and to the vigor which she thus instilled into her young men is partly attributed the success of her armies against the soldiers of the First Empire.

Gymnastic instruction was commenced in the French army some twenty-five years ago; and instructors for the service are now qualified in the school at Vincennes.

The first gymnasium of the British service was established at Aldershot over thirty years ago. The course is in accordance with a code of instructions drawn up by Mr. Maclaren of Oxford, the author of the work on physical education, which is referred to by Captain Foote as in use at David's Island. A medical officer is required to examine each man before the course is commenced. Afterward the recruits are examined fortnightly, and the older soldiers once a month.

The advantage of systematic instruction in a well-equipped gymnasium over the popular athletic sports of the day lies in this: that in the one all the voluntary muscles are exercised and trained in an intelligent and rational manner; trained to do the largest amount of work, with the least fatigue, and the smallest expenditure of force.

There is no useless muscular contraction; consequently there is no waste of energy.

In the other, the more popular sports of the day, only certain groups of muscles are commonly brought into play; such muscles as are required to produce but a limited series of motions. The exercise is moreover spasmodic, and often excessive. Certain groups are taxed to their utmost, or even damaged by overwork, while others are insufficiently exercised. The Indians of the Northwestern coast assume a squatting position while paddling their canoes, and the only muscles brought into play are those of the arms, chest and trunk. Many of them spend the larger part of their time in canoes, and the result is they are heavy-chested, stout-armed men, with the hips and legs of boys.

There is a faculty of perception connected with muscular structure which has been called the *muscular sense;* a sense which, unconsciously to onrselves, directs a large number of our complex movements. This sense is very susceptible to cultivation, and in its higher developments may be said to be automatic. The beginner on the violin has to employ the sense of sight and hearing to determine where his fingers shall be placed in order to make the desired notes. As he improves, the muscular sense begins to develop in that direction, and gradually takes the place of sight and hearing. The latter are ultimately "translated" into the muscular sense; and the unerring fingers of the *virtuoso* will fly over the instrument, while his eyes are closed and his thoughts far away. In certain affections of the spinal cord, in which this sense is lost to the

lower limbs, the individual cannot walk with his eyes closed or in the dark, nor without looking at the floor upon which he is stepping. The sense of vision has to take the place of the lost muscular sense.

The object of rational and systematic physical instruction is not alone the development of strength, but strength with agility; rapidity and harmony of muscular contraction; consentaneous action with the muscular and special senses. To develop, not a Farnese Hercules, but a Belvedere Apollo. The man who habitually wields a sledge-hammer might hang from the trapeze longer than could the acrobat; but when it came to letting go and seizing the other bar with unerring grip and lightning-like rapidity, he would be apt to come to grief. So he might, with one hand, hold at arm's length the accomplished sportsman; but he would make a sorry figure shooting at birds on the wing.

There is a wider bearing of this matter of physical education, and one that should be of interest to every one, be he civilian or soldier. Physical qualities obey the same laws of transmission as do the subtler traits of the mind. Finely organized muscle-cells are inherited as well as are finely organized brain-cells; and it behooves the lover of his race to see that the one condition is transmitted as well as the other.

Captain Samuel M. Mills, 5th Artillery, U. S. A.

It does seem absurd, as stated by the writer of this article, to question the beneficial results that would follow the introduction of gymnastic exercises as proposed by this paper. And now since it has been ordered for the recruiting depots, I see no reason why some provision should not be made for continuing this most beneficial exercise when the recruit reaches the station of his battery.

I believe this, with the canteen, is the panacea for most of the ills that men complain of at many stations, prominent among which is the want of outside amusements. I cannot say though, that it will reduce desertion. The cause for that is found within the man himself, and he is generally a bad man, his action being caused neither by anything in the service, nor by the absence of any privilege or comfort there.

I know of posts where there is every variety of drill, mechanical manœuvring, fatigue duty, etc., and where no complaint is made on the score of monotony in that way, but this does not supply the kind of exercise that men like, nor the amusement and diversion that a course of gymnastic exercises would give. I do not think I would prescribe it as a "drill" except for new men, and then under the supervision of a commissioned officer of the battery, and to be carefully watched; the more expert gymnasts or older men I would not hold down to any fixed hour and make it a task, but permit them access to the gymnasium at such times as other duties permitted. I would have instruction given in bayonet exercises, fencing and boxing.

Observation, and the experience gained in my own battery, has satisfied me of the absolute necessity of some occupation of this kind to keep men contented, and as a means of working off the unquiet and restless energies of some, who would otherwise seek amusement of another kind.

I am a believer in competitions among the men and between the batteries, in every possible way, and would favor awarding battery and regimental prizes for the best fencer or swordsman and all round athlete; recognized and properly conducted exercises as suggested would promote this.

As an illustration showing what men need, when they seek it themselves—a few years ago in sheer desperation, a few men of my own battery formed an athletic club or association, and without aid or assistance from any source, provided themselves with clubs and dumb-bells, for use on the porches and inside barracks. On the green adjoining my end of the barracks they constructed temporary and movable bars for

high jumping and pole vaulting, and arrangements for raising and throwing heavy weights and all sorts of tests for the trial of strength and agility. There was hardly an hour in the day, when the weather was pleasant, that some one would not be using this ground for exercise. The men of other batteries participated in this amusement, and this naturally begot a little rivalry, so that, when, a few years ago, it was proposed to get up athletic sports for the men on holidays, many were found among those that had used this ground who were willing to enter for the higher class competitions.

It remains, in justice to those that took an interest in these exercises, to say, that my battery out of five others, carried off 40 per cent. of the prize money, and at another time 60 per cent. of the number of prizes that were awarded.

The interest that has been taken in these exercises in my battery has further been the means of restraining and completely reforming two or three men who for want of some diversion and exercise would otherwise go off and get drunk.

I believe the establishment and encouragement of a systematic course of instruction for the men in gymnastics at all permanent posts would be of great service in every way.

Lieut. C. D. Parkhurst, 4th Artillery, U. S. A.

It was with the greatest interest that I read the article with the above title in the March number of the JOURNAL, and perhaps the best comment and criticism I can make thereon will be to give a brief account of a similar experience, where the greatest success and enthusiasm were the results of the methods followed. And as this was maintained for three years, and is still kept up so far as I know, the experiment can well be said to be a permanent success.

In the fall of 1887 I joined light battery F, 4th Artillery, then and now (March, 1891) under the command of Major Geo. B. Rodney, 4th Artillery.

As the winter approached, all the lieutenants were called together, and, briefly, the Major's views upon what to do for drill, etc., for the winter months were set forth. These ideas were that it would be imperative to do something, and, as the sabre was our only hand weapon, and its use should be taught, sabre drill would be a necessity. But, knowing full well the inevitable monotony that would result from an hour's sabre drill, and nothing else, each day, and being desirous also of teaching the men to be quick and agile, we were at liberty, and in fact required, to introduce some kind of gymnastics to vary the monotony, and at the same time, *under the head of "play,"* bring the men up to a good form of strength and agility, at the same time securing better attention and greater proficiency in the sabre drill.

At this time the battery had practically nothing in the way of apparatus. But we went to work upon the above idea, and from the very first it was a success. The idea was taught that, just so much the more attention and precision at drill, meant just so much the less drill and so much the more fun, the gymnastics coming in as a reward for the attention and precision shown, and as play or sport, pure and simple. But once in the three years was any punishment for inattention at drill necessary. That punishment consisted in keeping the offender busy at the drill for the entire hour, while all the rest were at play, and the one example was enough.

And under this disguise of "play," work, hard work, and lots of it, was cheerfully undergone. Each day there was a short, sharp drill, of from ten to fifteen minutes, with the most exact attention and precision required and cheerfully given. The men kept awake and alert, and learned rapidly and progressed continually. Then off went belts, sabres and blouses, and every one went to work with a view to have as much sport as possible.

Starting with nothing, the men voluntarily made, or contributed to obtain, the appa-

ratus we wanted, and, though forced to use a squad room for want of other room, we soon had a good gymnasium, with ring swing, parallel bars, horizontal bar, climbing pegs, vaulting horse, vaulting cord, spring-board, mattress, and a fair supply of Indian clubs, *light* dumb-bells, and single sticks. Boxing gloves were also gotten, and instruction given in boxing, the use of the broadsword, short-sword, and other exercises, while attention was also given to various bending exercises and calisthenics.

Although this sport was instituted and carried out in "fun" or "play," it is not to be understood that anything boisterous or subversive of discipline was permitted. Even though there was a marked departure from the ordinary routine of perfunctory drill, and the men were allowed freedom to work as they pleased, there being no "Jump by detail—Jump," yet an officer was always present to see that there was no shirking. The non-commissioned officers and the men themselves checked anything unseemly, and the spirit of emulation that was fostered kept every one up to the mark. A little good natured bantering was more effective than any harsh measures to secure an attempt at some new or difficult feat, and once the thing had been done by some one, that was enough to make all try it, and to keep at it until every one could do it. As a rule the officers were stripped as well as the men, and were constantly suggesting, showing, or trying something new, and trying by all the means in their power to keep up the interest, and to extend the exercises beyond the few simple things that were tried at first.

In every way, and in everything, more attention was paid to feats of quickness and agility than to mere feats of strength. No effort was made to develop simply muscle, or to learn to lift heavy weights. The requirements of light battery service were kept constantly in view and everything made to lead towards fearless riding, rapid mounting or dismounting from horse, limber or caisson, together with all the movements necessary to be done on foot. In each spring, when riding drills took place, the same training and system was carried to the riding school; mounted wrestling matches, vaulting onto and over a live horse instead of a wooden one, were followed up, mounting and dismounting at all gaits, and to both hands, standing up and lying down upon the horse's back, riding backwards, sideways and any way, were all carried out, as well as a special course of teaching men how to carry each other off the battle-field, how to hang on to a galloping horse and help themselves off by running with him. In fact, anything and everything that could be thought of, or found out by reading, that could possibly be of any use as an exercise, or as the result of such exercise, was tried and there were but few failures, and generally the most gratifying success.

In speaking of results, perhaps as good an idea as any can be had from the jumping or vaulting over the cord. I remember one man who at first could not jump the cord at 18 inches from the floor. He just simply did not know how to "gather" himself. A little good natured bantering kept him at it when he was about discouraged and he kept at it with the evident intention of succeeding. In less than a week he had "caught on" and could and did clear the cord with a free, clear cat-like jump when put at 4⅝ feet from the floor.

Others could do as well, and many better. I made a memorandum one day of the actual jumping; of 18 men all cleared the cord at 4 feet, over 75% at 4½ feet, about 50% at 4¾ feet, while two men could clear it at 6 feet, and this with only a poor apology for a spring-board.

They did equally well at other things, and the vaulting horse, that stood about 15½ hands high, that at first was a bug-bear to the majority, became an old story, with over 75% able to vault on it, and over it, lengthwise, sideways and in all sorts of ways.

The good results were to be seen everywhere. The men had a free, erect and manly carriage, could march as well as the best, and showed that they were "set up"

in every particular, and this too notwithstanding the fact that during these three years not a recruit was "set up" in the old-fashioned way. They were put in the gymnasium and encouraged to use their eyes and learn what others did, first by observation and then by trial. These new men soon were equal to the old, and gained their "set up" much more easily and comfortably to themselves, and much better too than they would have done, had they been put in ranks and been put through the "four exercises" with buttoned blouses, and been made to bend and twist, etc., etc., as a *purely military exercise*, as is so often the case.

At battery drill the evidences of benefit were numberless. Cannoneers mounted on their chests at all gaits with an ease and confidence that was remarkable. The drivers were free, reckless, unconscious riders who thought nothing of their seats, but gave all their attention to driving. When the cannoneers were required to mount upon the off horses, no matter what the gait, they came flying into the saddles with a free clear vault, and no one had to stop and "shin up a horse's leg," or to use the stirrup to get on. And all this was the result of the confidence attained from their gymnastic training and nothing else.

Long before the official drill book had been received, the seventeen or more new "setting up exercises" had been tried in the gymnasium in a gymnastic manner, with blouses off, suspenders down, and perfect freedom in every way for bodily and muscular movement. They were a most decided success when tried in the above manner, just as certainly as they would have been a total failure if they had been tried in ranks with blouses on, even though unbuttoned, and the precision, regularity, and keeping time of the usual military exercise had been required.

Tried as we tried them, men excused from drill, trumpeters, non-commissioned officers, and others came and *voluntarily* fell in and went through these exercises when the time came to try them, and that is pretty good evidence that they were not a nuisance or torture to the men, but were known to be a benefit that all wished to enjoy.

In conclusion I would say that I am more and more convinced that gymnastics should be encouraged, and in fact be insisted upon ; but that failure will be the inevitable result if they are made the dull, dry, routine grind that so often is the result of our routine, perfunctory way of drilling. Let officers and men *all* go at it. Let it be made a sport and pastime and be used as a recreation and reward for attention and proficiency at other drills that must be learned, and I believe there will be no failures and, before we know it, we will have a body of men in the ranks far better "set up" than now, more contented, with greater endurance, with greater confidence in themselves, and in every way more capable of being what they should be,—perfect soldiers.

Lieut. Jas. N. Allison, 2d Cavalry, U. S. A.

Perhaps the most remarkable feature of this report is the date of the inception of the undertaking here presented. That we should have reached the year of our Lord one thousand eight hundred and ninety-one and of the Independence of the United States the one hundred and fifteenth before the subject of military gymnastics should be officially presented to the notice of army officers, is one of those phenomena rarely to be encountered outside the conservative circles of the American military establishment. It is probably safe to assert that there is not an institution of note in any country of the world having for its object the gathering together of young men, whether for purposes of education, social intercourse or simple recreation, that does not include among its very first necessities of existence and prosperity a well-appointed gymnasium. The matter has been generally and conclusively decided so many years ago that it would appear hardly less than absurd to attempt a serious discussion of it at this day, even

as applying directly to the young men of our Army. Why the law of nature which impels young lions, young pigs and young humanity alike to frolic, to run, to leap and by a thousand varied movements to bring into active play and complete tension every muscle and fibre of the frame should not apply directly and with full force to young soldiers, is hard to see. An hour in a gymnasium means an hour's amusement as well as an hour's bodily exercise. All work and no play makes Jack a dull boy. And in the monotonous grind of drill in the morning, drill in the afternoon and drill in the evening to which the young recruit is subjected with intervals of nothing to do between times, may be found one of the prime causes of the heavy percentage of desertion from the depots. Idleness is one of the worst of demoralizers. That men desire and appreciate an opportunity for such occupation is clearly enough evinced by the sight of primitive affairs—rings, parallel bars, etc.,—in rear of almost every set of barracks and erected by the men themselves. But these are available only during mild and fair weather. In winter and the stormy season, when most needed, they cannot be utilized. And my own experience has invariably been, when, at post after post for many years past the question of a building for the purpose was suggested and urged, to hear the ultimatum pronounced by the commanding officer or quartermaster—"No place available." It is true the War Department has in past times offered certain encouragement to the end desired as may be seen in par. 313, revised Army Regulations. But suppose that such an institution as Harvard or Cornell University for example, had at any time published to its students as follows: "If the building material can be obtained without expense to the University and students desire to erect a building by their own labor for use as a gymnasium, the president will allow the use of a team and such tools, window-sash, doors and other material as can be spared,"—how the world would have laughed!

Lieut. Charles R. Noyes, 9th Infantry, U. S. A.

Captain Foote's article regarding the new gymnasium drill at the recruiting depots suggests a very interesting topic for discussion. It is very desirable that gymnasiums and gymnasium drills should be introduced at all military posts.

There are three things a company commander desires his company to attain. First: a practical and thorough knowledge of the drill regulations. Second: a superior degree of excellence in physical condition. Third: a spirit of contentment and subordination. The drill regulations are supposed to be simple, shorn of all superfluities, and designed to secure results most directly. If they are so there cannot be much in them for a company to learn, and short daily drills must suffice to keep a company in perfect readiness for the most critical inspector. They should be thoroughly instilled into the company, but they should not be regarded as a means of physical training, except incidentally. Excellence of physical condition, and that activity of the mind which insure attentive discipline, instant obedience and united action, can be most successfully developed by a system of gymnastic exercises or gymnasium drill arranged with special view to the results desired.

The time has come for extending the system of gymnastic training, which now forms a part of the course of instruction of the West Point cadet, to the enlisted men of the Army. Graduates of the military academy are now fitted to give instruction in these exercises, including bayonet drill and sword exercise, and if suitable gymnasiums, with proper equipment, were constructed at military posts, the gymnasium drill could be made one of the most useful and interesting duties of routine garrison life.

Not much need be said to support the idea that gymnastic exercises would increase the contentment of the enlisted men. The system of drill could be arranged so as to

possess great variety, and, at the same time, develop the men most effectively for severe physical effort.

But outside of the regular drill, gymnasiums would give opportunity for athletic contests and exhibitions of individual skill, as Captain Foote suggests. Undoubtedly athletic sports should be encouraged both in the gymnasium and out of it to promote contentment among the men. I believe company commanders would do much for the physical training of their companies and for the contentment of the men if they actively encouraged such sports as foot racing, boxing, rowing when convenient, lawn tennis, base ball and foot ball. The last-named game is eminently suited, under the new rules of the play, to develop what is called "team action," that is, united aggressive effort under control of a leader or commander. In this respect it is instructive from a military point of view.

As a final remark I would say that all lieutenants, who are at all athletic, ought to take active part in the sports that the men engage in, and direct them.

Lieut. W. C. Wren, 10th Infantry, U. S. A.

From my own experience and observation I can heartily agree with Captain Foote in his views on Military Gymnastics. The desire for this sort of training is clearly shown by the men themselves, there being hardly a company in the service that has not some apparatus (often home-made) which is used more or less by all the men. Now that the canteen profits can legitimately be used for the purpose of purchasing the different articles necessary, I can see no reason why gymnasia should not be established at all the posts in the Army, and all the men required to exercise therein, at least during the winter months. Recruits should receive gymnasium drill for some considerable time previous to being drilled in the regulation exercises, which, to a man unaccustomed to vigorous exercise, are excessively fatiguing. Even at posts where no canteen exists gymnastic exercises can be provided for, as the necessary apparatus can be improvised, and a fair gymnasium created at a small cost.

As a factor in the prevention of desertion, I believe this gymnastic training would be of great importance; not only because it would break the monotony of our present drill, but because it would tend to give each man the healthy mind which inhabits a healthy body, and thus prevent the morbid discontent, born of indolence and indigestion, which is a great cause of desertion.

Athletic training will do much to prevent the loss of men from fatigue during the first days of a march, and will enable packs to be carried with ease by men who, without training, would suffer much, or perhaps be totally disabled.

There really is nothing new on the subject of military gymnastics, for history teaches us that gymnastic training has ever been a prominent feature in the instruction of successful armies. The Spartans and the Romans were noted for their athletic training, and military gymnastics forms to-day a very considerable part of the instruction of the German and French soldiers. It is strange that so little attention has been given to this subject in our service, and it is gratifying to see that this branch of military training is at last beginning to receive the attention which its importance demands.

CORRIGENDA.

In "The Place of the Medical Department, etc.," in Comment and Criticism, in the March JOURNAL, (No. 49) on p. 344, in the second paragraph, "for by no means" read "by so much"—"Because it is practically untrue, 'assistant' is by so much derogatory to those who bear it."

On p. 347, at the close of the fifth paragraph, for "combination" read "commination"—"They are friends in council, and for open questions there is discussion, not commination."

Reviews and Exchanges.

Sherman's Personal Memoirs.*

WHEN General Sherman's personal memoirs were first published in 1875, they had no rivals. They told the story of his life and work in a straightforward way, with an occasional touch of his caustic pen, and with a brevity which quickens your memory and amuses you like all surprises.

Like a half-million other friends I read those "Memoirs" with increasing interest. They gave us accounts, explicit yet sufficiently condensed, from boyhood to youth, from youth to manhood, until they culminated in the great providential work of his life, —his military achievements.

Sherman's primary view, when he first launched his memoirs, was that no history of the Rebellion should be attempted until the War Records of both sides had been published. A remark he makes concerning the publication of these Records contains an illustration of the causticity referred to, which is, here as elsewhere, occasionally outcropping.

He says: "At the rate of progress for the past ten years, it is probable that the next century will come before they are published and circulated. * * *"

The "Memoirs" are what all memoirs ought to be, a faithful portraiture of events as they are contained in his own notes, letters or other memoranda, or as they rest in the capacious receptacle of his own memory.

Not only have the "Memoirs" proved interesting to the survivors who loved "the cause" which moved a nation to vindicate its own authority, but also to all reading men, friend and foe, throughout our land and the world.

There is always a reaction in literature as in everything else; so many memoirs, and all well written, flooded the country for a time, say for the next five years after these appeared, that reading people cried out to publishers of books and monthlies: "Give us something besides wars and fighting; we are tired of military writers." But now, if I mistake not, the "rising generation for whom Sherman wishes to witness, who are studying the history of our country, begin to demand more and more light; they are delighted with the pictorial descriptions given by men, who, like this brilliant war-chief, formed part and parcel of what they wrote. An intense interest just now seems to have revived, probably through the demand of young people. On this account we are glad that Sherman took away his books from the old publishers who became weary in their work, and gave them to a younger and more enterprising firm.

His own brief preface affords a key to his store-house. He is on the retired list; he has more leisure; he reviews his ten-year old "memoirs" in the light of the many criticisms, public and private, which have reached him; he gave ten years of time to the critics, and where will you find so many as those who write, pro and con, concerning campaigns and battles? He examined their differences; where error was discovered he quickly and unselfishly made the essential corrections.

* *Sherman's Personal Memoirs.* Last edition. Charles L. Webster & Company, New York.

At last he added two most important chapters. The first is at the threshold of the new work; the second gives the finish and close. Again we find attached an appendix that might be a volume in itself. It is composed of letters from distinguished actors, brief reports, fragments of history, and statistical records.

Sherman in his last preface again emphasizes his desire not to be considered a *historian*, but, as he expresses it, "a witness on the stand before the great tribunal of history."

Now he invites the memoirs of others; the testimony of other men and their criticism. A single sentence is unique and affords a glimpse of Sherman as an actor, as a witness and as a writer: "How much more likely will be the difference of opinion among contestants in a great battle covering a vast space of broken ground, when each division, brigade, regiment, and even company, naturally and honestly believes that it was the focus of the whole affair! Each of them won the battle. None ever lost. That was the fate of the old man who unhappily commanded."

When he again referred to the slow operation of the Government in publishing the Rebellion Records, we enjoy a sentence like this: "I am afraid that if I again assume the character of a prophet, I must extend the time deep into the next century, and pray meanwhile that the official records of the War, Union and Confederate, may approach completion before the next war; or rather, that we as a people may be spared another war until the last one is officially recorded. Meantime the rising generation must be content with memoirs, etc."

That first chapter to which I have alluded, touching upon matters between 1820 and the Mexican War, is full of interest to any reader who has come to care for the picturesque, the patriotic, the honest, the manly man of genius, who with last shoots of brilliancy has just disappeared from our horizon. Herein is his ancestry; here is his family; here his childhood and glimpses of his young manhood. If he sprang aboard a steamer there was new light there, and everybody on board caught a new touch of interest from his presence. An army post; an old Indian war; or a fishing and hunting expedition is taken out of the commonplace and made to furnish something bright and memorable.

His closing words in the new chapter remind us of General Grant's deep-seated sentiment, "that somehow there was a power over all and in all," the irresistible force, if you please, that brought about results. A favorite expression with Grant was, "It was to be."

Sherman says: "Still the Civil War was to be; and, now that it has come and gone, we can rest secure in the knowledge that as the chief cause, slavery, has been eradicated forever, it is not likely to come again." God grant that the clash between capital and labor; the bitterness of soul on the part of so many against the accumulations of wealth; the secret manœuvrings to disturb the very germs of universal liberty which spring from our common schools and the efforts of Socialists and Anarchists to overturn all present civilized society, may not ever in their incessant ferment be able to bring upon us the horrors and desolations of civil strife. We hope that Sherman's far-seeing soul uttered a true prophesy when he said: "Civil war is not likely to come again."

The bright pages of General Sherman's Memoirs have been now so long before the public that it is not necessary to give them at this time anything of a review. Whether the General claims to be a writer of history or not, yet herein is history and fairly condensed, and it is written in such style, with so much earnestness and vigor, that we can hardly begin reading a chapter without continuing to the end.

It is such a book that by opening it anywhere, an officer who has ever been associated with him will notice at once something sparkling, unusual, characteristic of the

man. The last chapter of that edition is indeed a compendium of military knowledge, and seems especially written for the officers and soldiers of the Regular Army.

I do not know anywhere to be found, in small compass, the better setting forth of what belongs to the Army organization or to the studies and duties of officers of a higher grade.

The last division, the new chapter, is entitled "After the War." This contains much that is interesting to the civilian and to the Army. We find the new territorial divisions that Sherman recommended, and the reasons for them, with the names of the officers in command, most of whom already deceased and the remainder long since retired. Here we find bright historical glimpses that are nowhere else recorded.

Sherman writes appreciatively of Dr. Durand, the leading man of the immense enterprise of the Union Pacific; then of his own interest in the work of transcontinental railroads, at that time deemed beyond the compass, means and ability of living men; he speaks of Senator E. D. Baker and his unequalled oratory. When in California he made a public speech on the occasion of the completion of 22½ miles of the Central Pacific road (1856) where the orator painted the "glorious things which would result from uniting the Western coast with the East by bands of iron."

What Sherman says of Baker is a specimen of his own style, and I think the picture worth remembering: "Baker then, with a poet's imagination, saw the vision of the mighty future, but not the gulf which meantime was destined to swallow up half a million of the brightest and best youth of our land, and that he himself would be one of the first victims far away (at Ball's Bluff) on the banks of the Potomac."

Sherman speaks of the Kansas Pacific and the construction of the Union Pacific and of the part borne in that work by those soldiers who defended the workmen, giving the names particularly of Generals P. St. George Cooke, Augur and Terry, department commanders.

The various larger tribes of Indians pass in quick review. The pasture fields of the immense herds of buffalo, the elk and the antelope that were so soon to disappear. A single sentence condenses his view: "I am sure that without the courage and activity of the department commanders and the small bodies of troops, the Pacific Railroad could never have been built; but once built and in full operation the fate of the buffalo and Indian was settled for all time to come."

One who was a great favorite with General Sherman because of his wonderful practical ability and large heartedness, was Gen. Granville M. Dodge, the commander of the 16th Army Corps. Perhaps it will never be known how much of pioneer work, direction, and finally of actual construction were due on these transcontinental roads to this general of excellent record, this superb engineer. After the war General Sherman kept in constant communication with him, advised and encouraged him effectively in all his labors.

In this chapter we find history that had long been secret. How President Johnson undertook to get rid of General Grant's immediate, and on account of politics, troublesome presence; how he was forced to cover his tracks, sending General Sherman and Mr. Campbell upon a fruitless expedition into Mexico, and what was the issue of the whole subject.

A single sentence like this brings back to those who lived in the days just succeeding the war a flood of light:

"I am sure the whole movement was gotten up for the purpose of getting General Grant away from Washington on the pretext of his known antagonism to the French occupation of Mexico, because he was looming up as a candidate for President, and *nobody* understood the *animus* and purpose better than did Mr. Stanton. He himself (Mr. Stanton) was not then on good terms with Presi-

dent Johnson, and with several of his associates in the Cabinet. By Christmas I was back in St. Louis."

Could the actors be now alive and read some of Sherman's revelations, it seems to me that various misunderstandings between Mr. Johnson and the principal men about him would be completely cleared up.

Then there are many of Grant's and Sherman's letters which speak for themselves.

In order to hinder General Grant from using officers who were made surplus in the consolidations in carrying out the peace policy with the Indians, certain politicians very adroitly succeeded in restraining the President by a restrictive clause in a law of Congress; they came to Grant when he very quietly told them "that he would defeat their purpose." "For I will divide these appointments up among the religious churches, with which you dare not contend." And it was done.

Other matters are to be found which produced temporary breezes, for example; when General Sherman became Commander-in-chief, succeeding General Grant; how he happened to favor General Belknap; how, as Belknap's greatness gradually increased, his relations with him were disturbed, causing him to insist on establishing his headquarters away from Washington; and how at last post-trader scandals began, developed, extended and were finally revealed.

In this pregnant portion we find a slight sketch of Washington City as it took its fresh start from the old to the new. Sherman speaks of the magic hand of A. R. Shepherd; how the town grew from a straggling, ill-paved city to one of the cleanest and most beautiful in the whole world.

In the brief space allotted me I would not attempt to do more than call the attention of our readers to the rich mine of historical knowledge which General Sherman in closing up the new edition of his work has afforded. What can be handsomer or more like these great men than the two letters given at the end, the one from President Chester A. Arthur and the other in answer from General Sherman himself. I think they will bear insertion in full.

"EXECUTIVE MANSION, February 8, 1884.

"General William T. Sherman, General of the Army, having this day reached the age of sixty-four years, is, in accordance with the law, placed upon the retired list of the Army, without reduction of his current pay and allowances.

"The announcement of the severance from the command of the Army of one who has been for so many years its distinguished chief, can but awaken in the minds, not only of the Army, but of the people of the United States, mingled emotions of regret and gratitude—regret at the withdrawal from active military service of an officer whose lofty sense of duty has been a model for all soldiers since he first entered the Army in July, 1840; and gratitude, freshly awakened, for the services of incalculable value rendered by him in the War for the Union, which his great military genius and daring did so much to end.

"The President deems this a fitting occasion to give expression, in this manner, to the gratitude felt toward General Sherman by his fellow-citizens, and to the hope that Providence may grant him many years of health and happiness in the relief from the active duties of his profession. CHESTER A. ARTHUR.

"By order of the Secretary of War:

"R. C. DRUM, Adjutant-General."

"ST. LOUIS, February 9, 1884.

"*His Excellency, Chester A. Arthur, President of the United States.*

"DEAR SIR: Permit me with a soldier's frankness to thank you personally for the handsome compliment bestowed in general orders of yesterday, which are reported in the journals of the day. To me it was a surprise and a most agreeable one. I had

supposed the actual date of my retirement would form a short paragraph in the common series of special orders of the War Department; but as the honored Executive of our country has made it the occasion for his own hand to pen a tribute of respect and affection to an officer passing from the active stage of life to one of ease and rest, I can only say I feel highly honored, and congratulate myself in thus rounding out my record of service in a manner most gratifying to my family and friends. Not only this, but I feel sure, when the orders of yesterday are read on parade to the regiments and garrisons of the United States, many a young hero will tighten his belt, and resolve anew to be brave and true to the starry flag, which we of our day have carried through one epoch of danger, but which may yet be subject to trials, and which may demand similar sacrifices, equal fidelity and courage, and a larger measure of intelligence. Again thanking you for so marked a compliment and reciprocating the kind wishes for the future, I am, with profound respect, your friend and servant,

"W. T. SHERMAN, General."

Indeed Sherman was right when after an unusual and modest acknowledgment of shortcomings, he says: "I feel sure that I can travel this broad country of ours and be each night a welcome guest in palace or cabin." O that he might be here to journey up and down the land as of yore! He would indeed be most welcome, and every cottage or palatial residence that he might visit would brighten with sunshine at his coming; but to those of us who knew him well there will ever be a strong hope of even brighter and happier meetings than any of those cherished ones, and they were many, which we here recall.

OLIVER O. HOWARD, Major-General U. S. Army.

GOVERNOR'S ISLAND, April 13, 1891.

Hannibal.*

What a character is presented for consideration in this volume! A leader, who with a force of but twenty-six thousand men undertakes the invasion of a country which can put into the field armies numbering more than a quarter of a million souls, must be either demented or far beyond the gauge by which mankind is ordinarily sized. That this great soldier was at all unbalanced is wholly disproved by his entire series of campaigns in Italy, extending over a period of fifteen years, from the latter part of 218 to the end of 203 B. C.

Hannibal, the author tells us, was born B. C. 249. He accompanied his father, Hamilcar, to Spain when he was but thirteen years of age, and there had his first lessons in war. There he gave it that profound study which, in future years, was to stand him in such good stead and make him one of the wonders and admirations of the military world. After his father's death he went back to Carthage and later returned to Spain at the age of twenty-five. He served three years in command of Hasdrubal's cavalry and during that time "left nothing unobserved which he who would become a great captain ought to see and to do." His career in Spain showed him to be a man of marked ability, but nothing recorded of him at that time indicated the great height to which he was destined to mount on the ladder of fame.

Steadfast hatred of Rome, we are told, was so constantly impressed on him during his early life that it became with him a sort of religion. Under the stress of this idea he conceived in B. C. 219 his gigantic scheme of invading Italy. Marching from Carthagena, in the spring of B. C. 218, with a force of 82,000 infantry, 12,000 cavalry and 37 elephants, he had to fight his way northward through Catalonia, and when at last he crossed the Pyrenees there remained less than 60,000 men, he having lost more

* *Great Captain Series—Hannibal.* By Colonel T. A. Dodge, U. S. A., retired. Boston: Houghton, Mifflin & Co. 1891.

than one-fourth of his force. Various losses by battle, disease and accident reduced his remaining body more than one-half by the time (five months after leaving Carthagena) that he stood safely in the valley of the Po, ready to start on his great errand of avenging the disgrace and misfortunes inflicted on his country in the first Punic War.

It is more than interesting to trace the course of Hannibal's march and his passage of the Alps as given in so great detail by Colonel Dodge. He tells us that in his investigations he has crossed every pass in the Alps by which the Carthagenian army could have made its way. There on the ground he studies the movement as narrated by the best authorities. He finds that the road by the Little Saint Bernard is the only one which fulfills all the conditions. He follows Hannibal in his journeyings through the length and breadth of Italy, visits all the important battle-fields and then tells the story of this marvellous series of campaigns in a way that all who read can understand.

The author disclaims the idea of "writing a military text-book." What can be better as a text-book on strategy than a carefully studied investigation of the facts connected with these campaigns? Discussion of potentialities is of little account. Why indulge in speculation as to the possible outcome of a march on Rome after the battle of Cannæ? The writer is wise in avoiding all this and keeping to facts, or to probabilities where the facts are not clear. He has made a book which is of real value to the military student.

But why, with all his genius and all his transcendant ability was Hannibal unable to accomplish the work which he set out to do? The answer is plain and a consideration of the causes of failure is fraught with valuable lessons for those who will study the conditions. The faults were not with the soldier. They came from lack of statesmen. Politics ruined both Hannibal and Carthage. The great leader understood that war waged in the enemy's country is kept away from home. In other words: the offensive is the true defensive. Hannibal saw this and knew that Rome must fall or Carthage must be lost. The politicians could not see so far. Spain was the great source of Carthagenian wealth, so every effort except the right one was made to save it. Blind fatuity! Hopeless imbecility! One half the forces sent to Spain would, had they gone to Hannibal, not only have saved it, but Carthage as well.

The contrast in the management of affairs in Rome and in Carthage is full of suggestion for every country. In the latter we find dissension, absence of all breadth of view, all important matters in the hands of small politicians unable to appreciate values or proportions. In the former the best men are put in control; the sentiment of the people is unanimous and the importance of the case is understood. That the leaders were the best men of Rome is shown by the ease with which they learned the lessons set them by their great antagonist and the profit which they drew from their experience.

Carthage, unable to see wherein lay her only chance, left Hannibal for fifteen weary years entirely to his own devices, with practically no assistance of men, money or stores. What must this man have been who, single-handed and alone, stood up and braved the Roman armies even when they outnumbered his own more than four to one? What was the power which enabled him to hold his often half-starved and ill-supplied hordes and with them breathe defiance against Rome for half a generation? Through all his trials and troubles his nerve never forsook him. Hope many times deferred may have made his heart sick, but he never showed sign of what he felt. His courage remained and, though constantly crowded back by the sheer weight of numbers, he held on to his place until Carthage summoned him to return; but the summons came too late. Her fate was already sealed and he was powerless to save. She was ruined in this war and not many years later she was destroyed. Her fate is full of lessons in what not to do.

The author has handled his subject well. Aside from its intrinsic value as a military study, Colonel Dodge's book is most interesting. His style is clear. His sense of proportion is good. He knows what he has to say and he says it. Having once begun, the reader does not wish to lay the volume down until he closes the cover on the last page, and as he does so there comes to him the thought: "*there* was indeed a man." F. A. M.

Modern War.*

It is some time since we had the pleasure of reviewing Part I. of this work, and the impressions then made upon our mind, have, in a measure, died out. We are satisfied, however, that the pleasure and profit which we have derived from a perusal of this second volume greatly exceed those which resulted from our perusal of the first. This second volume, if somewhat tardy in its appearance, comes before us in good shape. Its typography and general make-up are creditable to the publisher, and the translator has done his work well. We have discovered none of those idiomatic blemishes which are so difficult to exclude from translations of professional works. The book reads like an original composition in English. The language is generally clear, and never ambiguous. The reader finds no difficulty in grasping the idea intended to be conveyed, and, after having once carefully studied the map, can almost follow the movements of the troops on the battle-field without further reference. We have no hesitation in saying that this volume is one of the best text books on Modern Tactics which has come under our observation.

Examining the work more in detail, we are at once struck by the copious quotations from German authors which it contains. The introductory chapter consists largely of such quotations, and while they are all *apropos*, and evidently meet with the author's approbation, the application of the principles which they teach must be attended with some difficulty in practice. Indeed, the training of soldiers in time of peace in all the hardships of actual war, so far at least as marching is concerned, is considerably modified by the quotation from Major von der Goltz, which we find at the bottom of page 3. Overmuch zeal in the simulation of the realities of war on the drill ground, is apt to produce weariness and irritation, and "a necessary hardship of war" is about as hard to define as it is to exaggerate.

The ability to indite military orders in language so clear and exact that misinterpretation is impossible, is too little cultivated among military men. We are glad, therefore, to see that the author has recognized the importance of the subject. The common defect of most military orders is verbosity, and a tendency to descend to details which properly belong to a lower plane of authority. The higher headquarters seem to assume, either professional inefficiency or a low order of intelligence at the lower. Such assumptions, if persisted in sufficiently long, will always produce the conditions presupposed. There is nothing more disheartening to a military man than the receipt of an order, so loaded down with details, that it requires protracted study to be fully understood.

The order of Prince Frederick Charles, quoted on page 20, is a model of clearness and precision. It was issued on the spur of the moment, to meet an unforeseen emergency, and is therefore a working specimen, and not a studied effort at the ideal. It prescribes the night march of an army into position for battle, and in spite of the fact that the night was dark and stormy, it was executed almost to the letter. We read on page 23, that "all the divisions reached their assigned places between 5 and 6 A. M." This is a feat which will command the admiration of every soldier. It shows that the

* *Modern War. Part II. Grand Tactics.* By General V. Derrécagaix. Translated by 1st Lieut. C. W. Foster, 3d Artillery. Authorized Edition. James J. Chapman, Washington, D. C.

Germans have acquired, not only the art of inditing military orders, but also the art of obeying them. When we think of the elaborate compositions deemed necessary for the proper movement of a few companies in this country, we are ready to confess, that one of our greatest needs is a professor of military literature. We heartily agree with the author when he says that "one of the conditions of an army's fitness, is brevity of orders."—Page 6.

On the subject of advanced guards we learn that the tendency in Germany now is to reduce their strength to the lowest terms consistent with safety, and that they should consist chiefly of cavalry troops.—Page 7. This is a decided departure from the old rule, which put about one-fourth the column on the advanced guard, and the reasons given for the change are, in our opinion, hardly strong enough to justify it. It would be better, we think, to restrain bellicose commanders by the application of discipline, than to emasculate their commands and thus render them impotent in an emergency.

Officers who have had no war experience can hardly realize the slow progress of large bodies of troops. Assuming the gait of the drill book: infantry can march 100 yards per minute. This they say is 5000 yards per hour—allowing ten minutes for rest—and for eight hours 40,000 yards—over 22 miles. They will hardly be satisfied with the author's 13.8 miles as the extent of a day's march for a corps. But the author is right. Armies crawl on their bellies in more senses than one. Even in movements of emergency, in what are called forced marches, they cover much less ground than they ought to, in the estimation of inexperience. There is no more valuable chapter in the book than that devoted to marches.

In this connection the picture which the author paints of the transfer of Bazaine's army from Metz to the heights about Gravelotte – page 31—is very interesting and very instructive. The picture is almost entirely made up of quotations from orders, letters and reports; but they have been selected and arranged with such excellent judgment that they produce in the mind of the reader a perfect picture of the occurrences they describe.

The suggestion—page 42—that Bazaine "secretly resolved to delay the movement in the hope of seeing the Emperor depart," may be true; but we have never seen any evidence to justify its adoption. Bazaine was slow, no doubt; but he lacked the ability of Prince Frederick Charles in inditing orders in an emergency. He required time for such work. Most commanders do. The problem was a difficult one. To withdraw a large army across a river, in the face of a superior army in actual contact with it, is not an easy undertaking. We have no doubt that Bazaine would have been glad to get rid of the Emperor days before he left. Still it is uncharitable to assume that he deliberately compromised the safety of his army to effect it.

We find little really new in the discussion of "Manœuvre Marches." The old principles govern throughout, but the examples are taken from modern campaigns, which greatly heightens the interest of the discussion. But there is one new feature which we must not overlook, namely, the tendency to put masses of artillery near the head of the column. This is essential to a successful opening of the battle.

In the chapter on combats, while the principles enunciated are, perhaps, those generally accepted by professional men, we find some statements which are not in accord with our experience. We cannot admit that "it is the losses inflicted upon the enemy which sap his moral force and determine his retreat" (p. 69). We have seen organizations become demoralized without having lost a man. There is no reason to doubt the historical accuracy of the story of Gideon's victory over the Midianites as given in Judges vi. 19. In that case panic, demoralization and utter rout resulted from the blowing of trumpets and displaying of lights on all sides of the camp at night, and without the slaughter of a single man by the enemy; and many similar instances might

be found even in modern history. Any one who has witnessed a panic among troops in battle, or even an audience in a theatre, will not willingly admit that it takes actual slaughter to produce it. Slaughter, no doubt, is one way of producing it, but not the only way. Indeed, a close analysis of the phenomenon inclines one to the belief that it is spiritual in its nature. The Army of the Shenandoah, two-thirds of which were already broken, scattered, and demoralized, was recalled to duty, formed in line without regard to organization or any other aid to discipline, and launched successfully against its conqueror of a few hours before. What was it that steadied the nerves and revived the spirits of that army? Merely the arrival of General Sheridan. Any one who has witnessed phenomena of that description will be very apt to argue that there is a mysterious power in some men, under the influence of which timid men become brave and demoralized men confident.

Neither can we admit that "the moral force of troops depends upon the sentiment of duty animating them" (p. 69). It is the spirit that fights, and the spirit that gives staying powers to individuals and armies, as well as game-cocks, and the sentiment of duty has as little to do with it in the one case as in the other. The sentiment of duty may drive a man into the army, but when he is face to face with the foe, it is the spirit within him that sustains him. And that spirit, as we have seen, may be strengthened and stimulated in some mysterious way by the presence of a stronger and commanding spirit. Indeed Colonel Picq must have had some such idea when he wrote: "With equal power of destruction, that side will carry the day which is able, by its resolution, to march forward" (p. 70). It is impossible to account for all the phenomena of battle without appealing to the spiritual.

On page 78 we find a sentence which should be inscribed on every commission and warrant of authority. It is: "One of the ordinary obstacles in the way of the proper exercise of command, is a general tendency to encroachment from the top to the bottom of the hierarchy which manifests itself in all armies." If we may be permited the use of a slang expression, that is "awfully true." If everybody would mind their own business and do it, how much more efficient everybody would be.

The third chapter is devoted to a discussion of "The Combat," which the author enlivens by such illustrations as the combat of Trautenau, the combat of St. Privât and several others. The combats are accurately and dramatically described, the various phases of each struggle being treated separately as distinct acts in the drama of battle, and at the close of each description, comments are made on the results attained, the means employed and the causes which decided the action. These comments are made in a creditable spirit of professional fairness, and only a carping critic would complain of the slight tinge of patriotic prejudice which occasionally shows itself.

The fourth chapter is devoted to battles. The description of the battle of Woerth, which we have verified by comparison with the German account, is remarkably clear and accurate, and although the conclusions drawn by the author are sometimes a little strained, they are, as a rule, fully justified by the facts. The arrangement of the various scenes and acts in the great drama of battle is quite artistic, and enables one, with a small amount of reading, to form and retain in his mind, a correct and tolerably complete idea of the causes, management and consequences of the struggle. And what we say of Woerth is equally true of the other battles described.

That the immediate pursuit of a beaten army "will henceforth be more difficult of execution than has been the case heretofore," (p. 420) is a statement which we are unwilling to accept. Certainly the "development of battle fronts," and the other reasons alleged, do not sufficiently account for such difficulty, if it exists. The signal and field telegraph services make the transmission of orders and reports on the battle-field, prompt, certain and safe, and ought to negative any evil effects which might

result from the length of lines of battle. Even with the limited development which these services had attained during our war pursuits were sometimes prompt and vigorous, and when they were not, neither these services nor the length of line were to blame. The victorious army got out of hand for some reason, and the defeated army had time to get away, and to recover its *morale*, before the pursuit began. We are inclined to believe, that as a rule, the true cause of a tardy pursuit, must be sought for in the mind of the commander. We should regret the general acceptance of the idea, that immediate pursuit must henceforth be considered impracticable. Indeed the author himself seems to think otherwise. He says (p. 421) that "Pursuit may today, be as rapid and fertile in trophies, as in the Napoleonic epoch * * * Whenever the commander is impetuous, determined, alert, animated by the sacred fire of battle, constantly inflamed, and possesses the power to communicate to his subordinates the passion which sways him and urges him on." In other words, it depends entirely upon the spirit that is in him.

The chapter on retreats is interesting and instructive, but we must pass it by without comment, as this review has already reached its limit.

The seventh chapter might have been omitted. In it we see the old spirit cropping out, which has been the fountain of all the misfortunes of France. The author has evidently argued himself into the belief that France fairly divided the honors with her great antagonist in 1870–71, and preaches accordingly. He cites four great battles "in which nothing was lacking to crown the success of our arms, but a directing mind, untrammeled by personal considerations"—(p. 490). There are too many men yet alive, who learned the history of 1870–71, from day to day as it occurred, to make any preaching of that kind profitable. France was fairly beaten at every point in that war, and the author's effort to prove the contrary is a lamentable failure. There is no mistaking the facts of history which have been written by the sword.

JAMES CHESTER, Captain 3d Arty.

The Pharmacology of the Newer Materia Medica.*

The work of Messrs. Parke, Davis & Co., in developing the knowledge of hitherto unknown remedial agents has been familiar to the medical profession for the last decade and a half. Entirely casting off the trammels of trade this house has established a magnificent laboratory in which a liberally paid corps of well-known scientific workers are furnished with materials for complete investigation into the therapeutic qualities of new drugs. The series before us is the outcome of the labors of these gentlemen and includes the collected work of a large number of other students in the same direction. The botany, chemistry, and pharmacy are thoroughly considered as well as the therapeutics. Parts VIII. to X. cover the letters D to I, and among other subjects, treat of Duboisia, Eucalyptus, Chrysophanic acid, Grindelia, Strophanthus, Jaborandi and Jequerity.

J. E. P.

The Soldier's First-Aid Handbook.†

The trained nurse has become a recognized institution in civil life, the demands for his services far exceeding the supply. In the armies of other nations a similar demand has long been recognized, while the more recent organization of our own hospital corps may be considered a similar deference to modern ideas upon the part of our

* *The Pharmacology of the Newer Materia Medica.* Issued in bi-monthly parts. Parts VIII. Aug., Sept., 1890, IX. Oct., Nov., 1890, and X. Dec. 1890, Jan. 1891. Detroit: George S. Davis. 1890–91.

† *The Soldier's First-Aid Handbook*, comprising a Series of Lectures to Members of the Hospital Corps and Company Bearers. By William D. Dietz, Captain and Assistant Surgeon, U. S. Army. New York: John Wiley & Sons. 1891. Price $1.25.

authorities. The lamented author of this little book had achieved a high position as one of the most progressive and indefatigable laborers in the development of the hospital corps, and this work is the product of his efforts to put the necessary elements of physiology and the treatment of medical and surgical emergencies into a form so clear and simple as to be readily understood by the least intelligent bearer. The book covers very much the same ground as the first-aid handbooks prepared for civilian first aid societies, with sections upon the additional field offered by military service. A brief introduction to human anatomy and physiology, occupying about a quarter of the book, leads up to first aid on the battle-field, briefly including the general management of the wounded, the temporary treatment of hemorrhage, fractures, wounds, dislocations and sprains, together with the procedures to be adopted in cases of suspended animation. A third part treats of other emergencies demanding first aid, such as asphyxia, burns and frost bites, foreign bodies in the eye, ear and nose, together with a long section on poisons which are treated rather more fully than the other subjects. There are no illustrations, but the use of headings in bold-faced type serves to call ready attention to points sought for in the book. Dr. Dietz has left behind him a valuable contribution to the development of the corps which he held so near to his heart—a worthy memorial to us who mourn his untimely death.

CAPT. JAMES E. PILCHER,
Med Dept., U. S. Army.

BOOKS RECEIVED.

Personal Memoirs of General W. T. Sherman. Third edition. New York: Charles L. Webster & Co. 1890.

The Soldier's First-Aid Handbook. By William D. Dietz, Captain and Assistant Surgeon, U. S. Army. New York: John Wiley & Sons. 1891.

Tabulated Roster of the Army of the Potomac, at Gettysburg, Penn. July 1, 2, 3, 1863. Philadelphia. 1891.

Recollections of General Grant. By Geo. W. Childs. Philadelphia. 1891.

Decisions, Orders, etc., Affecting Target Practice, and the Small-Arms Firing Regulations. Compiled by 1st Lieut. C. L. Collins, Inspector of Small-Arms Practice Department of Arizona.

OUR EXCHANGES.

ARTICLES OF MORE OR LESS MILITARY INTEREST.

ARGENTINE REPUBLIC.

Boletin del Centro Naval. (November and December, 1890.)

BELGIUM.

La Belgique Militaire. (March, 1891) Monument to Prince Baldwin. Lieutenant-General Liagre. The Armament of our Strong Places.

Revue de L'Armée, Belge. (Vol. 3, 1880) Theory of Aerostatics. Torpedoes and Submarine Mines. Variations in Fire. Gruson Firing Experiments.

ENGLAND.

Journal of the Royal United Service Institution. (*No. 157.*) On the Present System of Enlistment and Pay of our Soldiers. On Army Cooking and Messing. On the Advantage of Forming Collections at Greenwich with a view to Supplying the means of Studying the Origin and Gradual Development of various branches of Naval Science.

Proceedings of the Royal Artillery Institution. (February, 1891) Experiences at Okehampton in 1890. Homing Pigeons. Ranging a Battery. (March) The R. A. Mess at Woolwich. Fire Discipline. Notes on the Equipment and Services of our Mountain Artillery.

Aldershot Military Society. Development of Modern Cavalry Action in the Field.

The United Service Magazine. (February, 1891) The British Navy of 1884-94. How to Make the Army Popular. The British Army in the City. The Newest Factor in Naval Warfare. Tactical Guides for the Cavalry Division. The Present Position of British and Foreign Armor. (March) The Study of War. Naval Officers and Service Information. A German View of the Defense of India.

United Service Gazette (To date). *Army and Navy Gazette* (To date).

FRANCE.

Revue Militaire de L'Etranger. (January and February, 1891) The Gross and Net Effective of the German Army. A Conscription of Horses in Russia. New Regulations for the Italian Infantry. Artillery Material Manufactured by the Gruson Works. The Danish Rifle, Model 1889.

Revue du Cercle Militaire. (February and March, 1891) The Greydon Torpedo Thrower. Pauses in Offensive Movements. The Occupation of Tokar. The Speed of Ships. The Infantry Attack. The Austria-Hungarian Landwehr. The Defensive Organization of Roumania.

Progrés Militaire (To date).

INDIA.

Journal of the United Service Institution of India. (Vol. 20, No. 84) Army Organization. The Military Training of Junior Regimental Officers. Thoughts Suggested by "A Summer Night's Dream." Targets and Marking.

NEW SOUTH WALES.

Journal of the United Service Institution of New South Wales. (Vol. 2) The Defense of a Protected Harbor. Harbor Defense by Guard-boats.

SPAIN.

Memorial de Artilleria. (January and February, 1891)

UNITED STATES.

The Century. (March, 1891) General Crook in the Indian Country. The Century Club. The Memoirs of Talleyrand. Colonel Carter of Cartersville. Résumé of Frémont's Expedition. The Origin of the Frémont's Explorations. Montgommery and Frémont. Madame de Rémusat on Talleyrand and Bonaparte. (April) Salons of the Revolution and the Empire. Cold Cheer at Camp Morton. Colonel Carter of Cartersville. To California by Panama in '49. The conquest of California. The Official Policy for the Acquisition of California.

Outing. (March, 1891) Across the Great Divide. How Old England Trains Her Red Coats. Evolution in Yacht Building. Round a Canoeist's Winter Camp-fire.

The North American Review. (March, 1891) Further Recollections of Gettysburg. The Future of the Sandwich Islands. The Menace of Silver Legislation. A Word About the Rear Guard. The Struggle in Canada. (April) Pauperism in the United States. The Example of a Great Life. The West and the Railroads. Men of the Salisbury Parliament. Civilization and Suicide.

The Railroad and Engineering Journal. (March, 1891) Building the New Navy. High Explosives for Military Use. A Note for Surveyors. Our Navy in Time of Peace. The United States Navy (Illustrated). (April) The United States Navy. The Submarine Mine and Torpedo in Harbor Defense. Our Navy in Time of Peace. The North Sea—Baltic Ship Canal.

The Pennsylvania Magazine of History and Biography. (April, 1891) The Life and Times of John Dickinson (1732–1888). Exchange of Major-General Charles Lee. Unpublished Letters of Benjamin Franklin.

Political Science Quarterly. (March, 1891) Political Ideas of the Puritans. The Case of the Negro. Compulsory Insurance in Germany. School Book Legislation.

Proceedings of the United States Naval Institute. (*No. 56*) (*No. 57*). The Enlistment, Training and Organization of Crews for our New Ships. Notes on an Experimental Ammunition Cart, Constructed for the Ordnance Department. Siacci's Ballistic Equations. On the Angle of Elevation in order that the Trajectory in Air shall Pass Through a Given Point. Target Practice. The Annapolis Armor Tests. Report of the Board on the Competitive Trial of Armor Plates.

The Popular Science Monthly. (March, 1891) The Tyranny of the State. The Relative Value of Cements. Adaptation to Climate. Hypocrisy as a Social Elevator. (April) From Freedom to Bondage. A Brief History of the Ohio River. Race Influence and Disease. Training for Character.

Journal of the U. S. Cavalry Association. (December, 1890) With the Reserve Brigade. Letters on Cavalry. Narrative of a Doctor's Experience as a Line Officer and Combatant in the Fall of 1860. The United States Cavalry in the Mexican War. The Latest Regulations for the Government of the German Cavalry in Screening and Reconnoitring Duties. Crossing of the Bystritza River in the First Don Con Cossack Division in Canvas Boats.

The United Service. (March, 1891) Pulaski and Charleston. Moltke. Under the Southern Cross. Perez, the King's Secretary.

Harper's Magazine. (March, 1891) The Argentine Capital. The Chinese Leak. The Literary Landmarks of Edinburgh. Nationality in Music.

Kansas City Times (To date). *Table Talk* (To date).
The Electrical World (To date). *The New York Critic* (To date).
Pharmacology of the Newer Materia Medica (To date).
Johns Hopkins University Publications (To date).
The 7th Regiment Gazette (To date). *St. Nicholas* (To date).
Monthly Weather Review (To date). *Army and Navy Register* (To date).
Philadelphia Weekly Times (To date). *The Boston Courier* (To date).
Home and Country (To date).
Transactions of the American Society of Civil Engineers.
Transactions of the Technical Society of the Pacific Coast.

ARTICLES ACCEPTED FOR THE JOURNAL.

Range and Position Finding, - By CAPT. E L. ZALINSKI, 5th U. S. Art'y.
Some Principles of Organization of our Coast Artillery,
By LIEUT. S. E. STUART, Ordnance Dep't.
The Evolution of Hospitals and other Provision for Wounded,
By MAJOR C. K. WINNE, Medical Dep't.
The Summary Court, - - - - - - - By R. MCK. POWER, Esq.
A Chapter of American Hisotory, By CAPT. F. H. E. EBSTEIN, 21st U. S. Infantry.
The Northern Volunteer, - - - - By COLONEL T. L. LIVERMORE.
Centralization and Decentralization in Army Affairs,
By COL. J. G. C. LEE, Q. M. Dep't.

Prize Essay—1891.

I.—The following Resolution of Council is published for the information of all concerned:

Resolved, That a Prize of a Gold Medal of suitable value, together with a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest; the subject to be selected by the Executive Council and the Prize awarded under the following conditions:

1. Competition to be open to all persons eligible to membership.*

2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before October* 1, 1891. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.

3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize;* and also in their order of merit those deserving of honorable mention.

4. The successful Essay shall be published in the Journal of the Institution and the Essays deemed worthy of honorable mention, shall be read before the Institution, or published, at the discretion of the Council.

5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Jan. 14, 1891, for the Prize Essay of 1891, is

"*THE TERRAIN IN ITS RELATIONS TO MILITARY OPERATIONS.*"

III.—The names of the members of the Board of Awards will be announced in the JOURNAL for July, 1891.

WM. L. HASKIN,
Secretary.

GOVERNOR'S ISLAND,
February 2, 1891.

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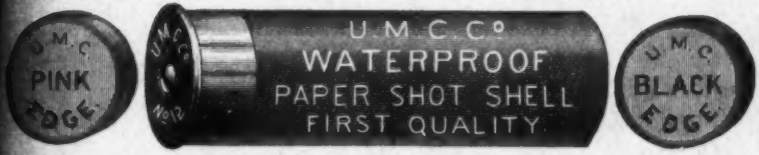

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Quartermaster's Dept....GEN. S. B. HOLABIRD.
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* Published in JOURNAL.

THE ADJUTANT-GENERAL'S DEPARTMENT.

By BREVET MAJOR-GENERAL JAMES B. FRY,

U. S. ARMY.

ON the 15th of June, 1775, George Washington was elected General and Commander-in-chief. It was resolved (by the Continental Congress, June 16th) "that there be appointed for the American Army two (2) major-generals, with pay $166 per month, eight (8) brigadier-generals and one (1) adjutant-general, with pay $125 per month." Horatio Gates, Esq., (of Virginia, late major, British army) was chosen adjutant-general June 17th, and it was resolved "that he shall have the rank of brigadier-general." His commission was signed by President Hancock, on the 19th of June.

On July 17, 1775, Congress resolved "that the convention at New York be desired to recommend to General Schuyler a proper person for a deputy adjutant-general or brigade major for the Army in the New York department." Subsequently, on September the 14th, Congress resolved "that Edward Flemming, Esq., be appointed deputy adjutant-general for the Army in New York or Northern department, with the rank of colonel, and that the President make out a commission for him accordingly, and forward the same the first opportunity." On November 8th, Congress approved General Schuyler's appointment of Captain David Dimon to be brigade major and ordered him a commission accordingly. Meanwhile the major-generals, on assuming command in separate departments, and the division commanders in the "Continental" Army before Boston, had, from the necessity of the case, to designate suitable persons to perform the functions of deputy adjutant-general or brigade major. By resolution of July 19th, Congress provided that "it be left to General Washington, if he thinks fit, to appoint three (3) brigade majors, and commission them accordingly."

The pressure of events, during this year, made it necessary to recognize in the continental or "regular" establishment such officers as had been raised with the troops in the several colonies by the provincial conventions, or councils of safety, for limited periods. These resolutions were of similar tenor to the resolutions of November 4th, which directed "the President to sign blank commissions, and that the conventions, or, in their recess, the councils of safety for South Carolina and Georgia, respectively, fill them up with the names of such officers as they may think proper, and return a list thereof to the Congress." The adjutant-general and deputy adjutants-general were commissioned to those offices, respectively, as well as many of the earlier appointments of brigade majors. The office of brigade major had come into existence early in the history of the constitutional British

army. The officer filling it was detailed from the officers of the line, receiving, usually, increased pay and allowances. His functions were similar to those of the acting assistant adjutant-general of the present day. The Army had but one adjutant-general who was at general headquarters. Deputy adjutants-general performed like services at subordinate army headquarters, and corps and wing headquarters. On the 30th of March, 1776, Congress resolved "that each brigadier-general when on command be empowered to appoint a brigade major." It was resolved, June 17th, that "General Washington be directed to send General Gates to Canada," and, on September 16th, that "the appointment of all officers, and filling up of all vacancies (excepting general officers) be left to the Government of the several States, * * * that all officers be commissioned by Congress." On the 5th of June, Lieutenant-Colonel Joseph Reed, of Pennsylvania, aide-de-camp to the General-in-chief, was elected adjutant-general. Read appears to have resigned about January 22, 1777, and Brigadier-General Arthur St. Clair acted as adjutant-general until his promotion to major-general, February 19, 1777, when Colonel George Weedon, of Virginia, performed the duties, although promoted to brigadier-general February 27, 1777. On the 20th of February it was resolved that "the President (of Congress) write to Major-General Gates and inform him that it is the earnest desire of Congress that he should resume the office of adjutant-general, and that his present rank and pay shall be continued." General Washington, from Headquarters Morristown, March 10th, also wrote to Gates, then at Philadelphia, to the same effect, but the latter declined, being then in a separate command. On the 26th of March it was "ordered that the President acquaint General Washington that Congress expects the office of adjutant-general to be filled up by a speedy appointment of a person of abilities and unsuspected attachment to these United States, and recommended Colonel William Lee to his consideration for this purpose." Congress, by Resolution of September 27, 1776, had already given Washington the power, for six months, "to displace and appoint all officers under the rank of brigadier-general, and to fill up all vacancies in every other department in the *American* Army." General Washington, in a letter to Colonel Timothy Pickering, of Salem, Massachusetts (late colonel Essex County Regiment), dated March 30, 1777, offered him the position "vacant by reason of the resignation of Colonel Reed, and the power of appointing a successor resting with me.' When Washington wrote to Pickering, offering him the appointment of adjutant-general, he enclosed a letter to Lee (who had been recommended for the position by Congress) offering it to him—the letter to Lee to be forwarded, in case Pickering should decline. Pickering did decline and sent the letter to Lee, who reported at Washington's headquarters. Pickering, however, subsequently reconsidered the matter, and determined to accept, whereupon Lee yielded his claims. On the 5th of January, 1778, Congress proceeded to the election of an adjutant-general in the room of Colonel Pickering, who was called to the Board of War by Resolution of November 7, 1777, and the ballots being taken, Colonel Alexander Scammel of the New Hampshire Continental Line was unanimously elected adjutant-general. Pickering,

however, continued to perform the duties until January 13, 1778, when Scammel assumed them. On the 17th of May, 1779, it was resolved that "the adjutant-general of the Army of the United States be allowed the same rations as a brigadier-general; that he be permitted to engage two assistants and one clerk." On the 22d of June it was resolved that "the adjutant-general for the time being be also assistant inspector general."

On the 8th of January, 1781, Brigadier-General Edward Hand of Pennsylvania was elected adjutant-general to succeed Scammel, who had been appointed colonel of the 1st New Hampshire Regiment Infantry, Continental Line, a position he did not long occupy as he was mortally wounded by a Hessian cavalryman in front of Yorktown, Virginia, September 30, 1781, and died a prisoner of war October 6, 1781. On the 1st of August, 1782, it was resolved that "the adjutant-general be appointed by Congress from the general officers, colonels, lieutenant-colonels commandant, or lieutenant-colonels in the Army. * * * He shall have two assistants and one clerk to be appointed by himself and approved of by the Commander-in-chief. The assistants shall be majors or captains of the Army. * * * That there shall be as many deputy adjutants-general, of the rank of field officers, as there may be separate armies in the United States that consist of one or more divisions, to be appointed occasionally by the commanding officer of such army, whose names shall be returned to the commander-in-chief for his approbation. * * *

"The deputy adjutants-general shall appoint each one assistant, of the rank of major or captain, who shall be approved of by the commanding officer under whom they serve.

* * * * * * * * *

"That there be one major of brigade to each brigade in the armies of the United States, whether of cavalry, artillery, or infantry, who shall be appointed by the Commander-in-chief, or commanding officer of a separate army, as occasion may require, upon the recommendation of the adjutant-general or deputy adjutant-general as the case may be.

* * * * * * * * *

"These regulations shall take effect on the 1st day of January next, and from thenceforth all acts, resolutions, pay and appointments heretofore made in any wise respecting the department of adjutant-general and brigade majors shall cease and are hereby repealed." On the 31st of December it was resolved that "Brigadier-General Hand be and is hereby continued in the office of adjutant-general." He retained the office until almost all of the Revolutionary Army was disbanded on November 5, 1783, in pursuance of a proclamation issued by Congress on the 18th of October previous.

From the disbandment of the Army, 1783, until the act of March 3, 1791, there was no regular adjutant-general (or brigade major as it was sometimes called), and no authority for the commissioning of such an officer. On October 31, 1784, from headquarters 1st American Regiment, Fort Pitt, Ensign Ebenezer Denny, of this regiment (late of 1st Pennsylvania Continental Line), was appointed adjutant, he having acted as such from August 12, 1784. On July 31, 1787, Congress appointed lieutenant-colonel

commandant, and brevet colonel, Josiah Harmar, of this regiment, a brevet brigadier-general, and placed him on duty as General-in-chief with the emoluments of his brevet rank, which gave him command not only of his own regiment but of the battalion United States artillery. On the 28th of October, 1787, from headquarters Fort Finney, General Harmar appointed Ensign Denny as acting adjutant-general. The act of March 3, 1791, gave the President power to call into service the militia or to enlist volunteers for six months, and to form them into regiments under the denomination of levies, and to appoint the commissioned officers. Governor Arthur St. Clair, of the Western Territory, was appointed major-general March 4, 1791, thereby superseding brevet Brigadier-General Harmar as "General-in-chief." Lieutenant Ebenezer Denny, adjutant 1st U. S. Infantry, was appointed aide-de-camp to Major-General St. Clair, September 30, 1791, in general orders of that date from headquarters, camp on the Great Miami, near Fort Washington. (This camp was afterwards called Fort Hamilton.) Brevet Major Winthrop Sargent, of Massachusetts (late Corps of Artillery, Continental Line), was secretary of the Western Territory, under Governor St, Clair, and was called into service with the rank of lieutenant-colonel of militia, early in September, 1791, and at Ludlow's Station announced as acting adjutant-general. In the disastrous engagement of November 4, 1791, with the Miami Indians, Colonel Sargent was badly wounded—receiving two bullets in his body which he carried until his death. The act of March 5, 1792, recognized a "general staff," in which is found one "adjutant" to do also the duty of "inspector." President Washington appointed Winthrop Sargent, late acting adjutant-general, "adjutant" and "inspector" under this act of March 5th, and he was confirmed by the Senate, April 11, 1792, but declined the appointment. Meanwhile, on March 5, 1792, Major-General St. Clair had resigned his commission, and Anthony Wayne (formerly brigadier-general, Continental Army) was, on the same day, appointed major-general, and placed as "General-in-chief" over the United States Army. Capt. Henry de Butts, 4th Sub-Legion, U. S. A. (of Maryland), the first aide-de-camp to General Wayne, acted as adjutant-general until the office was filled by an officer *specially* detailed for that duty. Major Michael Rudolph, who had been a captain in the Maryland Line Continental Army, was, while major of dragoons, U. S. A., then nominated and confirmed as "adjutant" and "inspector," February 23, 1793, *vice* Winthrop Sargent, declined. He resigned July 17, 1793, and was succeeded by Major John Mills, 2d Sub-Legion, U. S. A., of Massachusetts, who was confirmed as "adjutant" and "inspector," May 13, 1794, *vice* Rudolph, resigned. He died in office July 8, 1796. The act approved March 3, 1795, recognized the office of "adjutant-general" to do also the duty of inspector, and directed that "the present military establishment of the United States, composed of a corps of artillerists and engineers and a *legion* to consist of 4800 non-commissioned officers, privates and musicians be continued, "that they be completed," etc. This is the first mention in the *laws* of a "legion."

The legion was the favorite idea of General Henry Knox, then Secretary of War. It was divided into four sub-legions, each of which was to consist of one brigadier or sub-legionary general, with one aide-de-camp, one

brigade or sub-legionary major and inspector, one quartermaster and one surgeon. The forces in each sub-legion comprised 1280 non-commissioned officers, musicians and privates, and were to consist of one troop of dragoons, one company of artillery, two battalions of infantry, and one battalion of rifles—each battalion to have four companies. The legionary staff itself was to consist of the major-general or legionary general, two aides-de-camp, one adjutant and inspector, one major commandant of cavalry, one quartermaster, one deputy quartermaster, one surgeon and one chaplain. On November 1, 1796, pursuant to the act of May 30, 1796, the President arranged and completed out of the legion, four regiments of infantry,and two companies of light dragoons,taking care as far as practicable to arrange two sub-legions back again to their original infantry numbers, the first sub-legion again becoming the 1st regiment United States Infantry—supernumerary officers and soldiers were discharged from that date, the officers thus discharged receiving each six months' pay and subsistence. The act of May 30, 1766, directed that "after the last day of October, 1796, the military establishment shall consist of the corps of artillerists and engineers, two companies of light dragoons, four regiments of infantry of eight companies," and section 3 of the act directed, amongst other details, that "there shall be one inspector who shall do the duty of adjutant-general." The general staff authorized by this act was to continue in service only until the following March 4th. From the decease of Adjutant-General Mills, in July, 1796, until the appointment of an inspector under this act, Major Jonathan Haskell, 4th sub-legion, a revolutionary officer, and Captain Edward Butler (Pennsylvania) of the rifle battalion, 4th sub-legion, sub-legionary major and inspector, were successively detailed by Major General Wayne to perform the functions of adjutant-general to the United States Army. On February 27, 1797, Major Thomas H. Cushing (Massachusetts) of the First United States Infantry (formerly 1st Lieutenant Massachusetts Line Continental Army), was appointed by the President, with consent of the Senate, to be "inspector." He by law was also required to do the duty of "adjutant-general." The act passed March 3, 1797, repealed section 3 of the act of May 30, 1796, regulating the general staff. It made no provision for a major-general *vice* Wayne deceased—nor for an adjutant-general, but allowed one brigadier-general, who could choose his brigade major, also an inspector from the captains and subalterns in the line. The act of May 22, 1798, amended the act of March 3, 1797, so as to permit the brigadier-general—who was now General-in-chief—to select his brigade major and inspector or either of them from commissioned officers of any grade in the line of the Army. Major Cushing had not relinquished his rank in the infantry upon receiving the commission of inspector. He continued to perform the duties of inspector and adjutant-general, under detail, even after his commission of inspector had by operation of law expired March 3, 1797. The act of May 22, 1798, enabled Brigadier-General James Wilkinson, then General-in-chief, to keep him on duty as "inspector," section 2 of this act giving to Major Cushing by name, the difference between his major's and inspector's pay and allowances while thus serving by appointment of General Wilkinson, from

March 3, 1797, to May 22, 1798. No other officer represented the Adjutant-General's Department except the brigade major on immediate duty at Army Headquarters from March 3, 1797, until July 19, 1798, when, under the act of May 28th of that year, Brevet Major William North, of Massachusetts, (formerly aide-de-camp to Major-General Baron Steuben, and afterwards Inspector of the Army in 1784) was appointed adjutant-general, with the rank, pay and emoluments of a brigadier-general. This act (May 28, 1798) authorized "the President *alone* to appoint, from time to time when he shall judge proper, assistant inspectors to every separate portion of the Army, consisting of one or more divisions, who shall be deputy adjutants-general thereof, respectively, and who shall be taken from the line of the Army," they receiving extra pay while on such duty.

The act of March 3, 1799, provided for the better organization of the troops heretofore authorized, and directed that the adjutant-general of the Army (a brigadier-general) shall be *ex-officio* assistant inspector-general (the inspector-general at this time was Alexander Hamilton, with the rank of major-general), and that every deputy inspector-general shall be *ex-officio* deputy adjutant-general, and shall perform the duties of adjutant-general of the Army to which he shall be annexed. The act of May 14, 1800, provided for the disbandment of the Army, except the first four regiments of infantry, the two regiments of artillerists and engineers, the two troops of light dragoons and the general and other staff authorized by the several laws for the establishing and organizing of the aforesaid corps. In pursuance of this act, the inspector-general, adjutant-general, and other officers appointed for the "Provisional Army" raised during the continuance of differences between the United States and the French Republic, were disbanded on the 15th of June, 1800. Brigadier-General Wilkinson again became "General-in-chief," in consequence of such disbandment; Major Cushing, 1st U. S. Infantry, continuing to be inspector to the Army, and on duty under immediate orders of the Secretary of War. Major Cushing continued to fill the office, by detail, until Congress again made it a distinct office. The act of March 16th, 1802, fixed the military peace establishment at one regiment of artillerists, two regiments of infantry, and a corps of engineers, not to exceed twenty officers and cadets, and, amongst other details, provided for one "adjutant and inspector of the Army," to be taken from the line of field officers. On the 25th of March, President Jefferson sent the following nomination to Congress: * * * "Thomas H. Cushing, Adjutant and Inspector of the Army," * * * which nomination was confirmed March 26, 1802. Major Cushing became by promotion lieutenant-colonel of the 2d U. S. Infantry, April 1, 1802, and colonel of his regiment September 7, 1805, but as the only limitation as to the appointment of an "adjutant and inspector" was that he should be a "field officer," Colonel Cushing continued to perform the duties now performed by the adjutant-general of the Army, until April 2, 1807. First Lieutenant James Biddle Wilkinson, (of Maryland) 2d U. S. Infantry, was appointed aide-de-camp to his father, the General-in-chief—December 1, 1804,—was promoted to be Captain 2d U. S. Infantry, December, 1808, and

continued to perform the duties of aide-de-camp and of acting assistant adjutant-general to the troops in the field when under immediate command of his father, until his own death, September 7, 1813. There appears to have been no change in the legal authorization for an "adjutant and inspector" until 1812, although during that period there were changes in the incumbents.

The act of January 11th, amongst other details, provided for five brigadier-generals, each to be allowed a brigade major to be taken from the captains and subalterns of the line, and for one adjutant-general with the rank, pay and emoluments of a brigadier-general; the adjutant-general to be allowed one or more assistants, not exceeding three, to be taken from the line of the Army, with the same pay and emoluments as a lieutenant-colonel, but no officer detached to serve in the general staff to thereby lose his rank. On the 15th of March, the Hon. William North, formerly adjutant-general of the Army, was again nominated and confirmed as adjutant-general, but he declined the office, and on the 6th of July, Colonel Thomas H. Cushing, 2d Infantry, late "adjutant and inspector," was appointed and confirmed. Soon afterwards Adjutant-General Cushing was nominated and confirmed a brigadier-general in the Army, to rank from July 2, 1812, which was an earlier rank than that given to him in his commission as adjutant-general with the rank of brigadier-general. General Cushing continued, however, to perform the duties of adjutant-general at the seat of government, and contributed greatly by his long experience as head of that department, towards the organization of the large regular and volunteer force called suddenly into existence in consequence of the war with Great Britain.

The act of July 6, 1812, directs that "to any army of the United States, other than that in which the adjutant-general shall serve, the President may appoint one deputy adjutant-general who shall be taken from the line. * * * and there shall be to each deputy adjutant-general such number of assistant deputies (not exceeding three to each department) as the public service may require." The act of March 3, 1813, organizing the "general staff" of the Army, provided for an "Adjutant-General's Department" to consist of an adjutant and inspector-general, with the rank, pay, and emoluments of a brigadier-general; not exceeding eight adjutants-general, each with the rank, pay, and emoluments of a colonel of cavalry; and sixteen assistant adjutants-general, each with the brevet rank, pay, and emoluments of a major of cavalry. The act further authorized the President, when he should deem it expedient, to assign one of the brigadier-generals to the principal Army of the United States, who should, in such case, act as adjutant and inspector-general, and as chief of the staff of such Army. This was the first mention of the "Adjutant-General's Department," *eo nomine*. On March 12, 1813, Brigadier-General Cushing relinquished his junior and now superseded commission of "adjutant-general," and was assigned to the command of Military District No. 1, comprising the States of New Hampshire and Massachusetts. On the same day Brigadier-General Zebulon M. Pike, U. S. A., was appointed by President Madison to be "adjutant and inspector-general" to the Army commanded by the "General-in-

chief," (Major-General Henry Dearborn) but on April 27, 1813, General Pike was killed in the assault and capture of the British fortifications at York (now Toronto), Upper Canada. From this time until May 19, 1814, the office remained vacant, the act of March 3, 1813, having been construed to the effect that there could be but one adjutant and inspector-general, who must either be an officer appointed and confirmed to that office, or else be a brigadier-general especially designated by the President to perform the functions. The affairs of the office at the War Department were meanwhile administered by Colonel A. T. Nicoll, inspector-general, and Major C. K. Gardner, 25th Infantry, assistant adjutant-general, in their branches, respectively, during the remainder of the year 1813. On May 19, 1814, Brigadier-General William H. Winder, U. S. A., was appointed "adjutant and inspector-general," and chief of staff to the Northern Army, but did not retain the office long, as, on July 2d, following, he was assigned to the command of the Tenth Military District, and commanded the American forces in the affair at Bladensburg, and unsuccessful defense of Washington. General A. T. Nicoll, inspector-general, having resigned, June 1, 1814, he was succeeded by Colonel John R. Bell, inspector-general (promoted from assistant inspector-general, October 20, 1814), at the War Department. In the adjutant-general's office, proper, Colonel John De B. Walbach, adjutant-general, administered affairs, under the direction of the Secretary of War, from December 30, 1813, until November 22, 1814, when Daniel Parker, of Massachusetts, chief clerk of the War Department, was nominated and confirmed by the Senate as "adjutant and inspector-general." The act of March 3, 1815, reduced and fixed the military peace establishment at 10,000 men, but made no provision for an "Adjutant-General's Department." The act required the President to discharge supernumerary officers on May 1, 1815, or, "as soon as circumstances may permit," and we find that by executive general orders of May 17, 1815, one adjutant and inspector-general, and two adjutants-general were "provisionally retained." Had not President Madison seen fit to retain such officers this act would have virtually abolished the department. The act of April 24, 1816, recognized and made permanent in service, these officers, thus provisionally retained, and declared that the department should hereafter consist of an adjutant and inspector-general with the rank, pay, and emoluments of a brigadier-general; an assistant adjutant-general, with the rank of colonel, to each division (of which there were two); and an assistant adjutant-general with the rank of major, to each brigade (of which there were four). The department therefore consisted, at this time, of seven officers, and general orders of May 3, 1816, based on the act, publishes their names, etc.

The act of March 2, 1821, fixed the military peace establishment at four regiments of artillery, of nine companies each; seven of infantry, of ten companies each, and the corps of engineers, and provided for one adjutant-general, with the rank, pay, and emoluments of a colonel of cavalry, and directed that the aides-de-camp to the major-general and the brigadier-generals should, in addition to their other duties, perform the duties of assistant adjutant-general. This act, in effect, reduced the department to one commissioned officer.

Brigadier-General Henry Atkinson, who, in order to be retained in service, had consented to be arranged according to his earlier commission of colonel and brevet brigadier-general, was offered by President Monroe the position of "adjutant-general," but he elected, on August 13, 1821, to take his former regiment, the 6th Infantry, from which he had the year before been promoted. Colonel James Gadsden, inspector-general, was, thereupon, on the same day (August 13, 1821) appointed adjutant-general. The Senate negatived his confirmation on March 22, 1822, and on the following April 12th, the President renominated him for the office, but the Senate adhered to its original determination. Capt. Charles J. Nourse, 2d Artillery, late "assistant adjutant-general," was detailed as "acting adjutant-general" of the Army, May 8, 1822, and took charge of the office and continued to perform the functions of adjutant-general until relieved, March 7, 1825, by the appointment of Captain Roger Jones, 3d Artillery (late colonel and adjuant-general), to be adjutant-general, with his old rank. There appears to have been no change in the legal status of the department from 1821 to 1838, when the act of July 5th of that year, increasing the military establishment, empowered the President to appoint so many assistant adjutants-general, not exceeding two, with brevet rank, pay and emoluments of a major, and not exceeding four with the brevet rank, pay and emoluments of a captain of cavalry, as he might deem necessary, to be taken from the line of the Army, and in addition to their own to perform the duties of assistant inspectors-general when the circumstances of the service required; the transfer of these officers to be without prejudice to their rank and promotion in the line, which was to take place in the same manner as if they had not been transferred. This again made the Adjutant-General's Department to consist of seven officers. The act of March 3, 1839, to amend an act entitled "an act regulating the pay and emoluments of brevet officers," approved April 16, 1818, directs that "the same shall be construed as to include the case of the Adjutant-General of the United States." This act reads "The officers of the Army who have brevet commissions shall be entitled to and receive the pay and emoluments of their brevet rank when on duty, and having a command according to their brevet rank and at no other time." Act approved June 18, 1846, providing for the prosecution of the war between the United States and the Republic of Mexico, empowered the President to appoint as many additional assistant adjutants-general, not exceeding four, as the service may require, with the same rank, pay and emoluments, and to be charged with the same duties as those now authorized by law; appointments to continue only as long as the exigencies of the service might render necessary. Under this act two majors and two captains were appointed. The department, therefore, now consisted of eleven officers. The act of March 3, 1847, making provision for an additional number of general officers, and for other details, directed that there be added to the Adjutant-General's Department, one assistant adjutant-general, with the rank, pay and emoluments of a lieutenant-colonel of cavalry, and two assistant adjutants-general, with the brevet rank, pay and emoluments of a captain of cavalry, to be charged with the same duties as those now existing by law, and the officers so appointed to be discharged at the close of the war

with Mexico. This brought the strength of the department up to fourteen. The act of July 19, 1848, repealed so much of the act of March 3, 1847, as required the discharge at the close of the war with Mexico * * * of an assistant adjutant-general, with the rank, pay and emoluments of a lieutenant-colonel of cavalry, and two assistant adjutants-general, with the rank, pay and emoluments of a captain of cavalry; provided that no vacancy happening under the provisions so repealed be filled up until further authorized by law. The act of March 2, 1849, repealed so much of the proviso to the 3d section of the act approved July 19, 1848, as related to officers of the Adjutant-General's Department, which left the department with an aggregate strength of fourteen officers, with authority to make promotions and fill vacancies. This continued to be the strength of the department until 1861. The act of August 3, 1861, providing for the better organization of the Army, directed that "hereafter the Adjutant-General's Department shall consist of one adjutant-general, with the rank, pay and emoluments of a brigadier; one assistant adjutant-general, with the rank, pay and emoluments of a colonel of cavalry, and two assistant adjutants-general, with the rank, pay and emoluments each of a lieutenant-colonel of cavalry; four assistant adjutants-general, with the rank, pay and emoluments of a major of cavalry, and twelve with the rank, pay and emoluments of a captain of cavalry" (total 20). The act of July 17, 1862, directed that "one colonel, two lieutenant-colonels, and nine majors be added to the department by regular promotion from its present officers, and that the grade of 'captain' be abolished, and in future that all vacancies in the grade of major be filled by selection from among the captains of the Army"—(total strength of the department, 20). The act of July 28, 1866, directed that "the adjutant-general shall hereafter be appointed by selection from the corps to which he belongs." The act of March 3, 1869, prohibited promotions and appointments in the Adjutant-General's Department, but by act of March 3, 1873, the appointment of one assistant adjutant-general, with the rank of major, was authorized. Thus the legal strength of the Adjutant-General's Department at this time was one brigadier-general, two colonels, four lieutenant-colonels, and thirteen majors (twenty in all), but by the act of March 3, 1869, prohibiting promotions and appointments, the department became reduced to one brigadier-general, one colonel, three lieutenant-colonels, and eleven majors (sixteen in all). The act of March 3, 1875, "to reduce and fix the Adjutant-General's Department," directed that "said department shall hereafter consist of one adjutant-general, with the rank, pay and emoluments of a brigadier-general; two assistant adjutants-general, with the rank, pay and emoluments of colonels; four assistant adjutants-general, with the rank, pay and emoluments of lieutenant-colonels, and ten assistant adjutants-general, with the rank, pay and emoluments of majors"--(seventeen members in all). This act also repealed so much of the act approved March 3, 1869, as prohibited promotions and appointments in the Adjutant-General's Department.

The act of February 28, 1887, "to effect a rearrangement of grades of office in the Adjutant-General's Department of the Army" directed that "The Adjutant-General's Department of the Army shall consist of one

adjutant-general, with the rank, pay and emoluments of a brigadier-general; four assistant adjutants-general, with the rank, pay and emoluments of colonel; six assistant adjutants-general; with the rank, pay and emoluments of lieutenant-colonel; and six assistant adjutants-general, with the rank, pay and emoluments of major: *Provided* that the vacancies in the grade of colonel and lieutenant-colonel created by this act shall be filled by the promotion by seniority of the officers now in the Adjutant-General's Department."

At this date, therefore (May, 1891), the legal strength of the Adjutant-General's Department is seventeen, and the department is open to promotion and appointments on the occurrence of vacancies.

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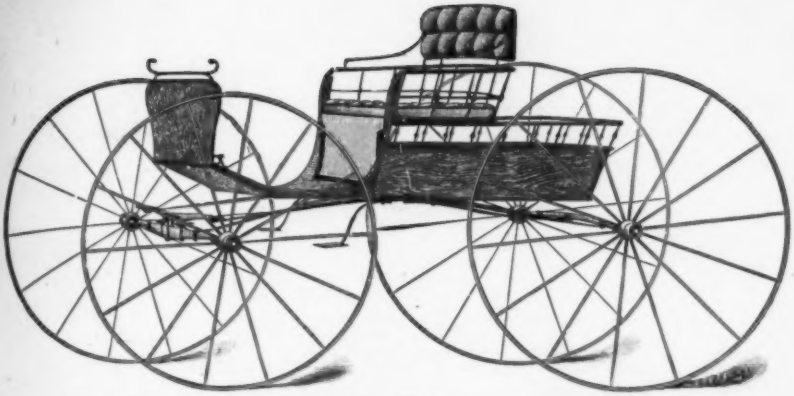

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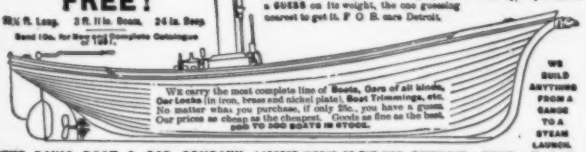

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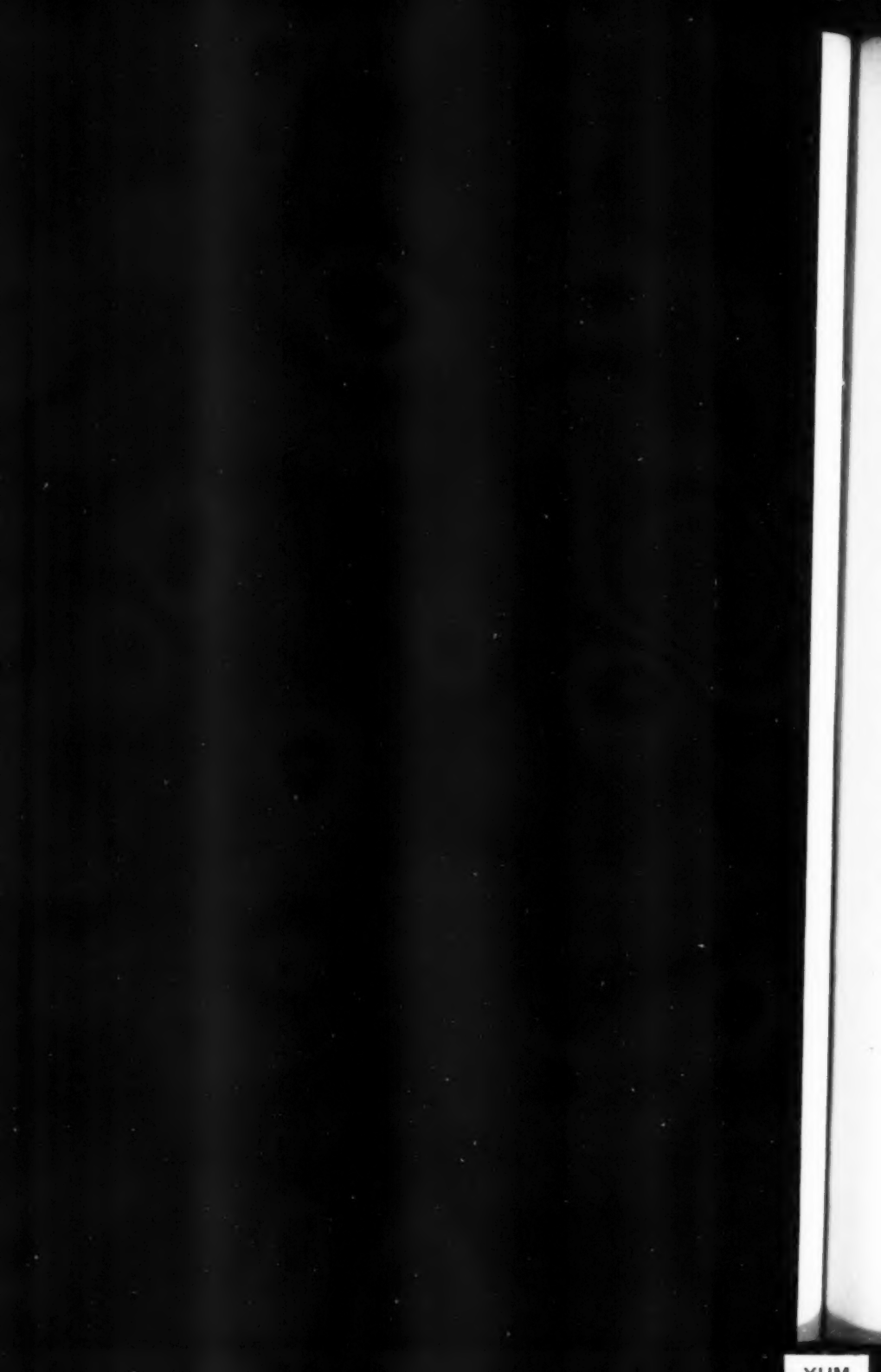

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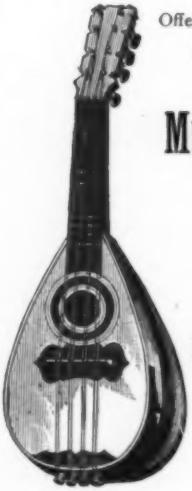

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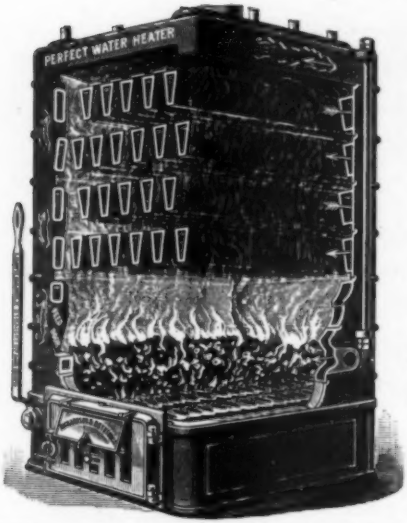

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